Adobe After Effects Help

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Chapter 1: Introduction to After Effects

What's new in After Effects

Top new features

Preview and playback performance improvements

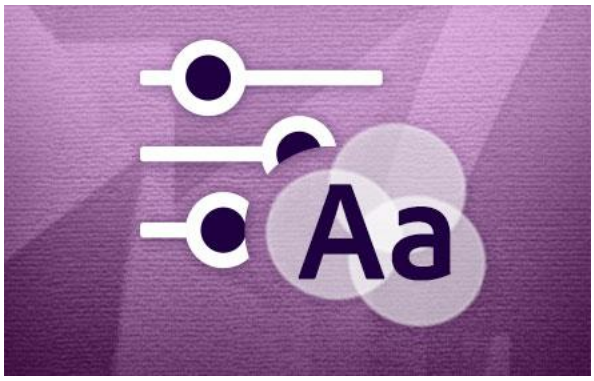
Preview playback is rock-solid with threading improvements and a new GPU-accelerated display system core. Get an accurate view of your designs without breaking your creative flow.

Enhanced EXR workflows

Get up to 12x faster performance when working with multi-channel EXR files. Import layered EXR files as compositions and get started compositing faster.

Faster shapes

Create and edit shapes quickly with improved performance. Stay organized with more accessible grouping controls.



Graphics and text enhancements

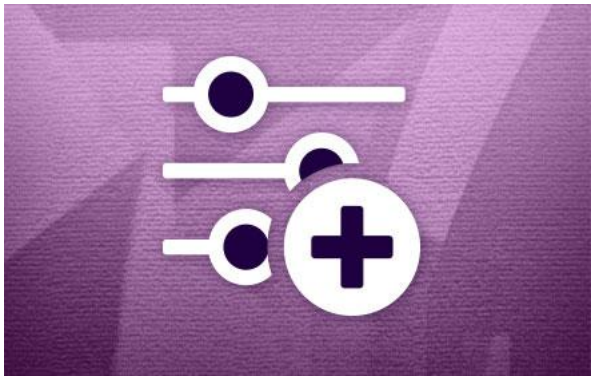
Take advantage of new dropdown menu expression controls and text style expressions to adjust many settings at once and design templates that are easier for your clients to update in Premiere Pro.

Expression improvements

For expressions that don't change over time, After Effects will apply them to all frames at once with up to 40% faster processing. Expressions applied to master properties are significantly faster as well.

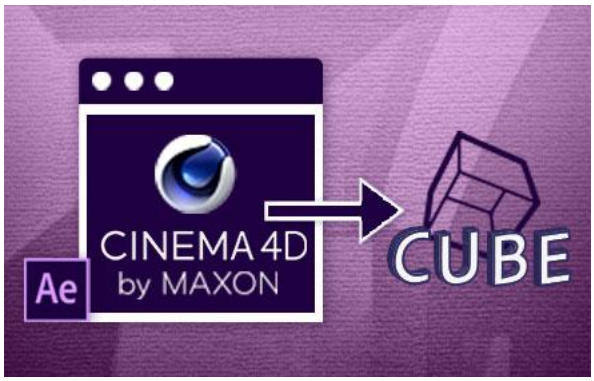
Expanded format and better playback support

Format support includes Canon XF-HEVC plus import for two legacy formats: Animation with delta frames and MJPEG. Get improved performance for 10-bit H.265 HD/UHD, HEVC HD/UHD, and ProRes files.



Other enhancements

Also includes better notifications for system compatibility.



Cinema 4D Lite R21

Get the latest release of C4D Lite with new features including caps and bevel tools for creating extruded text and splines. A new high-performance denoising filter improves visual quality and reduces rendering times.

Content-Aware Fill for video improvements

Remove unwanted objects faster with enhanced Content-Aware Fill, now twice as fast and uses half as much memory.

See detailed new feature summary

Previous releases of After Effects

- Features Summary | After Effects | April 2019 release
- Feature Summary | After Effects | 2019 releases
- Feature Summary | After Effects | 2018 releases

Keyboard shortcuts in After Effects

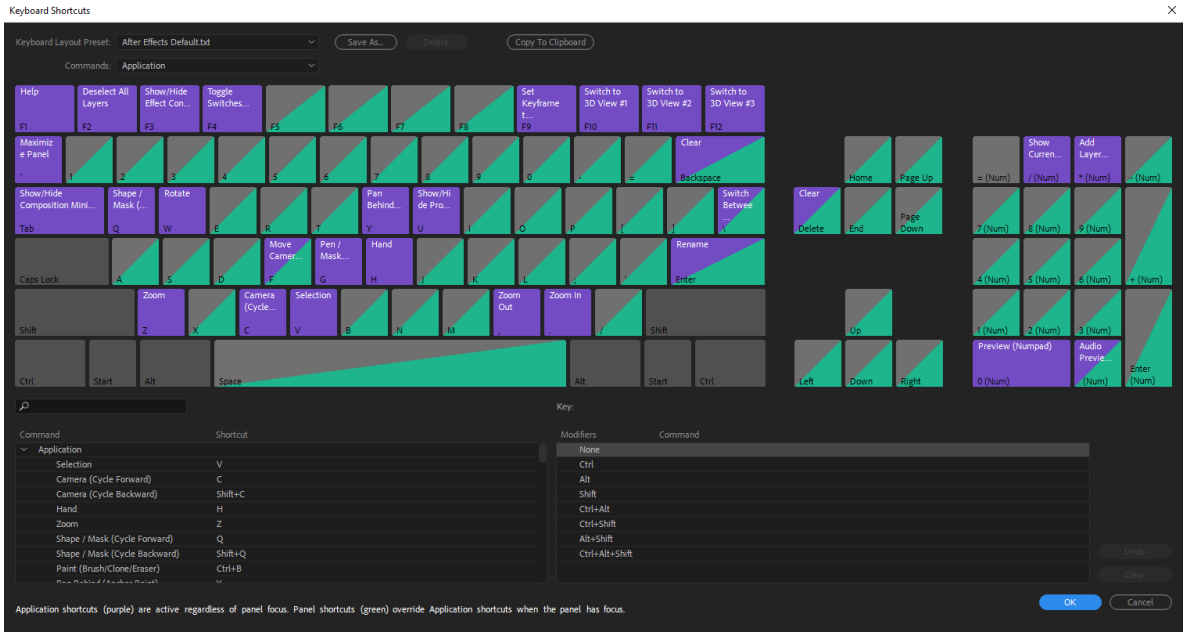
Visual Keyboard Shortcut Editor

You can work visually when you lay out your keyboard shortcuts with the visual keyboard shortcut editor. You can use the keyboard user interface to view the keys that have been assigned shortcuts, available keys for assignment, and modify assigned shortcuts.

Work with Visual Keyboard Shortcut Editor

To open the editor, select **Edit > Keyboard Shortcuts** (*Ctrl+Alt+'*).

The editor is divided into three parts:



Keyboard shortcut UI

- **Keyboard layout**: A representation of the hardware keyboard where you can view which keys have been assigned a shortcut, and which are available.
- **Command list**: The list displays all the commands that can be assigned shortcuts.
- **Key modifier list**: The list displays all the modifier combinations and assigned shortcuts associated with the key you select on the keyboard layout.

Color coding

Gray: In the keyboard layout, keys shaded gray do not have any shortcuts assigned to them.

Purple: In the keyboard layout, keys shaded purple are assigned application-wide shortcuts.

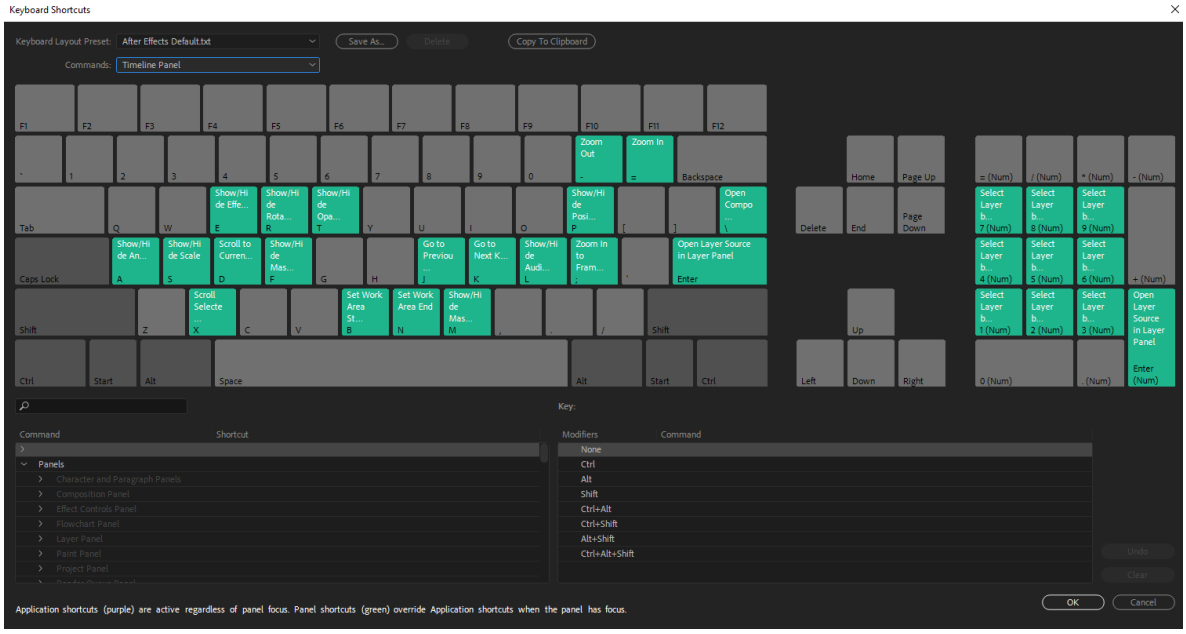
Green: In the keyboard layout keys shaded green are assigned panel-specific shortcuts.

Application Shortcuts

The keyboard layout displays application-wide shortcuts by default. These shortcuts work irrespective of which panel is selected. The **Command** list displays the entire set of commands available. When you select a key in the keyboard layout for application-wide commands, the key is outlined with a blue focus indicator. The **Command** list displays the **Application** command assigned to it. The Key modifier list inspects and it displays a list of all the commands assigned to the key and each of the possible modifier combinations.

Panel shortcuts

You can switch to panel-specific view from the **Command** drop-down list. The keyboard layout only displays keys shaded green. These shortcuts only work when the specific panel is active. When you view a set of **Panel** shortcuts, only the commands specific to that panel are displayed.



Panel shortcuts

Assigning shortcuts

You can assign shortcuts to commands in the **Command** list shortcut column. Select the command and type the shortcut in the text field. You can search for commands in the **Command** List, which is filtered by the search criteria. You can also assign shortcuts by clicking in the shortcut column and tapping keys on their keyboard to create the shortcut (including adding modifiers).

You can also assign shortcuts by dragging a command from the **Command** list onto a key in the keyboard layout or to the **Key** modifier list. You can drag keys in the keyboard layout onto a command in the **Command** List to assign them to the command. When a **Panel** shortcut has the same assigned shortcut as an **Application** shortcut, the application-wide shortcut does not function when that panel is active.

When After Effects detects a non-supported keyboard, the default view is to display the U.S. English keyboard. By default, the After Effects Default preset is displayed.

Exceptions

After Effects does not allow you to reassign the following keys:

- A
- AA
- E
- EE
- F
- FF
- L
- LL
- M,

- MM
- P
- PP
- R
- RR
- S
- SS
- T
- TT
- U
- UU

Key tool tips

Long commands assigned to keys are abbreviated. Hover over a key to view a tool tip containing the full name of the command, and information whether it is an **Application** or **Panel** shortcut.

Conflicts and resolutions

Conflicts

A warning indicating a shortcut conflict appears when:

- An **Application** shortcut already in use by another **Application** shortcut.
- A **Panel** shortcut is already in use by another command in the same panel.
- A **Panel** shortcut overrides an **Application** shortcut when that panel has focus.

Resolution

- When you type a shortcut that is already in use with another command, a warning message is displayed at the bottom of the editor.
- **Undo** and **Clear** buttons in the lower right corner are enabled.
- The command in conflict is highlighted in blue, and clicking this automatically selects the command in the **Command** List.

Saving custom keyboard shortcut sets

You can modify the shortcuts and save them using the **Save As** button.

General

Result	Windows	Mac OS
Select all	Ctrl+A	Command+A
Deselect all	F2 or Ctrl+Shift+A	F2 or Command+Shift+A

Rename selected layer, composition, folder, effect, group, or mask	Enter on main keyboard	Return
Open selected layer, composition, or footage item	Enter on numeric keypad	Enter on numeric keypad
Move selected layers, masks, effects, or render items down (back) or up (forward) in stacking order	Ctrl+Alt+Down Arrow or Ctrl+Alt+Up Arrow	Command+Option+Down Arrow or Command+Option+Up Arrow
Move selected layers, masks, effects, or render items to bottom (back) or top (front) of stacking order	Ctrl+Alt+Shift+Down Arrow or Ctrl+Alt+Shift+Up Arrow	Command+Option+Shift+Down Arrow or Command+Option+Shift+Up Arrow
Extend selection to next item in Project panel, Render Queue panel, or Effect Controls panel	Shift+Down Arrow	Shift+Down Arrow
Extend selection to previous item in Project panel, Render Queue panel, or Effect Controls panel	Shift+Up Arrow	Shift+Up Arrow
Duplicate selected layers, masks, effects, text selectors, animators, puppet meshes, shapes, render items, output modules, or compositions	Ctrl+D	Command+D
Quit	Ctrl+Q	Command+Q
Undo	Ctrl+Z	Command+Z
Redo	Ctrl+Shift+Z	Command+Shift+Z
Purge All Memory	Ctrl+Alt+/ (on numeric keypad)	Command+Option+/ (on numeric keypad)
Interrupt running a script	Esc	Esc
Display filename corresponding to the frame at the current time in the Info panel	Ctrl+Alt+E	Command+Option+E

Projects

Result	**Windows**	**Mac OS**
New project	Ctrl+Alt+N	Command+Option+N
Open project	Ctrl+O	Command+O
Open most recent project	Ctrl+Alt+Shift+P	Command+Option+Shift+P
New folder in Project panel	Ctrl+Alt+Shift+N	Command+Option+Shift+N
Open Project Settings dialog box	Ctrl+Alt+Shift+K	Command+Option+Shift+K
Find in Project panel	Ctrl+F	Command+F
Cycle through color bit depths for project	Alt-click bit-depth button at bottom of Project panel	Option-click bit-depth button at bottom of Project panel
Open Project Settings dialog box	Click bit-depth button at bottom of Project panel	Click bit-depth button at bottom of Project panel

Preferences

Result	Windows	Mac OS
Open Preferences dialog box	Ctrl+Alt+; (semicolon)	Command+Option+; (semicolon)
Restore default preferences settings	Hold down Ctrl+Alt+Shift while starting After Effects	Hold down Command+Option+Shift while starting After Effects

Panels, viewers, workspaces, and windows

Note:

(Mac OS) Shortcuts involving function keys F9-F12 may conflict with shortcuts used by the operating system. See Mac OS Help for instructions to reassign Dashboard & Expose shortcuts.

Result	Windows	Mac OS
Open or close Project panel	Ctrl+0	Command+0
Open or close Render Queue panel	Ctrl+Alt+0	Command+Option+0
Open or close Tools panel	Ctrl+1	Command+1
Open or close Info panel	Ctrl+2	Command+2
Open or close Preview panel	Ctrl+3	Command+3
Open or close Audio panel	Ctrl+4	Command+4
Open or close Effects & Presets panel	Ctrl+5	Command+5
Open or close Character panel	Ctrl+6	Command+6
Open or close Paragraph panel	Ctrl+7	Command+7
Open or close Paint panel	Ctrl+8	Command+8
Open or close Brushes panel	Ctrl+9	Command+9
Open or close Effect Controls panel for selected layer	F3 or Ctrl+Shift+T	F3 or Command+Shift+T
Open Flowchart panel for project flowchart	Ctrl+F11	Command+F11
Switch to workspace	Shift+F10, Shift+F11, or Shift+F12	Shift+F10, Shift+F11, or Shift+F12
Close active viewer or panel (closes content first)	Ctrl+W	Command+W
Close active panel or all viewers of type of active viewer (closes content first). For example, if a Timeline panel is active, this command closes all Timeline panels.	Ctrl+Shift+W	Command+Shift+W
Split the frame containing the active viewer and create a viewer with opposite locked/unlocked state	Ctrl+Alt+Shift+N	Command+Option+Shift+N
Maximize or restore panel under pointer	` (accent grave)	` (accent grave)
Resize application window or floating window to fit screen. (Press again to resize window so that contents fill the screen.)	Ctrl+\ (backslash)	Command+\ (backslash)

Move application window or floating window to main monitor; resize window to fit screen. (Press again to resize window so that contents fill the screen.)	Ctrl+Alt+\ (backslash)	Command+Option+\ (backslash)
Toggle activation between Composition panel and Timeline panel for current composition	\ (backslash)	\ (backslash)
Cycle to previous or next item in active viewer (for example, cycle through open compositions)	Shift+, (comma) or Shift+. (period)	Shift+, (comma) or Shift+. (period)
Cycle to previous or next panel in active frame (for example, cycle through open Timeline panels)	Alt+Shift+, (comma) or Alt+Shift+. (period)	Option+Shift+, (comma) or Option+Shift+. (period)
Activate a view in a multi-view layout in the Composition panel without affecting layer selection	Click with middle mouse button	Click with middle mouse button

Activate tools

Note:

You can activate some tools only under certain circumstances. For example, you can activate a camera tool only when the active composition contains a camera layer.

To momentarily activate a tool with a single-letter keyboard shortcut, hold down the key; release the key to return to the previously active tool. To activate a tool and keep it active, press the key and immediately release it.

Result	Windows	Mac OS
Cycle through tools	Alt-click tool button in Tools panel	Option-click tool button in Tools panel
Activate Selection tool	V	V
Activate Hand tool	H	H
Temporarily activate Hand tool	Hold down spacebar or the middle mouse button	Hold down spacebar or the middle mouse button
Activate **Zoom In** tool	Z	Z
Activate **Zoom Out** tool	Alt (when Zoom In tool is active)	Option (when Zoom In tool is active)
Activate **Rotation** tool	W	W
Activate Roto Brush tool	Alt+W	Option+W
Activate Refine Edge tool	Alt+W	Option+W
Activate and cycle through Camera tools (Unified Camera, Orbit Camera, Track XY Camera, and Track Z Camera)	C	C
Activate **Pan Behind** tool	Y	Y
Activate and cycle through mask and shape tools (Rectangle, Rounded Rectangle, Ellipse, Polygon, Star)	Q	Q

Activate and cycle through **Type** tools (Horizontal and Vertical)	Ctrl+T	Command+T
Activate and cycle between the **Pen and Mask Feather** tools. (Note: You can turn off this setting in the **Preferences** dialog box.)	G	G
Temporarily activate Selection tool when a pen tool is selected	Ctrl	Command
Temporarily activate Pen tool when the Selection tool is selected and pointer is over a path (Add Vertex tool when pointer is over a segment; Convert Vertex tool when pointer is over a vertex)	Ctrl+Alt	Command+Option
Activate and cycle through Brush, Clone Stamp, and Eraser tools	Ctrl+B	Command+B
Activate and cycle through Puppet tools	Ctrl+P	Command+P
Temporarily convert Selection tool to Shape Duplication tool	Alt (in shape layer)	Option (in shape layer)
Temporarily convert Selection tool to Direct Selection tool	Ctrl (in shape layer)	Command (in shape layer)

Compositions and the work area

Result	Windows	Mac OS
New composition	Ctrl+N	Command+N
Open Composition Settings dialog box for selected composition	Ctrl+K	Command+K
Set beginning or end of work area to current time	B or N	B or N
Set work area to duration of selected layers or, if no layers are selected, set work area to composition duration	Ctrl+Alt+B	Command+Option+B
Open Composition Mini-Flowchart for active composition	Tab	Tab
Activate the most recently active composition that is in the same composition hierarchy (network of nested compositions) as the currently active composition	Shift+Esc	Shift+Esc
Trim Composition to work area	Ctrl+Shift+X	Command+Shift+X
New Composition from selection	Alt+\	Option+\

Time navigation

Result	Windows	Mac OS
Go to specific time	Alt+Shift+J	Option+Shift+J
Go to beginning or end of work area	Shift+Home or Shift+End	Shift+Home or Shift+End

Go to previous or next visible item in time ruler (keyframe, layer marker, work area beginning or end) (Note: Also goes to beginning, end, or base frame of Roto Brush span if viewing Roto Brush in Layer panel.)	J or K	J or K
Go to beginning of composition, layer, or footage item	Home or Ctrl+Alt+Left Arrow	Home or Command+Option+Left Arrow
Go to end of composition, layer, or footage item	End or Ctrl+Alt+Right Arrow	End or Command+Option+Right Arrow
Go forward 1 frame	Page Down or Ctrl+Right Arrow	Page Down or Command+Right Arrow
Go forward 10 frames	Shift+Page Down or Ctrl+Shift+Right Arrow	Shift+Page Down or Command+Shift+Right Arrow
Go backward 1 frame	Page Up or Ctrl+Left Arrow	Page Up or Command+Left Arrow
Go backward 10 frames	Shift+Page Up or Ctrl+Shift+Left Arrow	Shift+Page Up or Command+Shift+Left Arrow
Go to layer In point	I	I
Go to layer Out point	O	O
Go to previous In point or Out point	Ctrl+Alt+Shift+Left Arrow	Command+Option+Shift+Left Arrow
Go to next In point or Out point	Ctrl+Alt+Shift+Right Arrow	Command+Option+Shift+Right Arrow
Scroll to current time in Timeline panel	D	D

Previews

Result	Windows	Mac OS
Start or stop preview	Spacebar, 0 on numeric keypad, Shift+0 on numeric keypad	Spacebar, 0 on numeric keypad, Shift+0 on numeric keypad
Reset preview settings to replicate RAM Preview and Standard Preview behaviors	Alt-click Reset in Preview panel	Option-click Reset in Preview panel
Preview only audio, from current time	. (decimal point) on numeric keypad*	. (decimal point) on numeric keypad* or Control+. (period) on main keyboard
Preview only audio, in work area	Alt+. (decimal point) on numeric keypad*	Option+. (decimal point) on numeric keypad* or Control+Option+. (period) on main keyboard
Manually preview (scrub) video	Drag or Alt-drag current-time indicator, depending on Live Update setting	Drag or Option-drag current-time indicator, depending on Live Update setting
Manually preview (scrub) audio	Ctrl-drag current-time indicator	Command-drag current-time indicator
Preview number of frames specified by Alternate Preview preference (defaults to 5)	Alt+0 on numeric keypad*	Option+0 on numeric keypad* or Control+Option+0 (zero) on main keyboard
Toggle Mercury Transmit video preview	/ (on numeric keypad)	/ (on numeric keypad), Control+/ on main keyboard
Take snapshot	Shift+F5, Shift+F6, Shift+F7, or Shift+F8	Shift+F5, Shift+F6, Shift+F7, or Shift+F8
Display snapshot in active viewer	F5, F6, F7, or F8	F5, F6, F7, or F8

Purge snapshot	Ctrl+Shift+F5, Ctrl+Shift+F6, Ctrl+Shift+F7, or Ctrl+Shift+F8	Command+Shift+F5, Command+Shift+F6, Command+Shift+F7, or Command+Shift+F8
Fast Previews > Off	Ctrl+Alt+1	Command+Option+1
Fast Previews > Adaptive Resolution	Ctrl+Alt+2	Command+Option+2
Fast Previews > Draft	Ctrl+Alt+3	Command+Option+3
Fast Previews > Fast Draft	Ctrl+Alt+4	Command+Option+4
Fast Previews > Wireframe	Ctrl+Alt+5	Command+Option+5

Note:

Some shortcuts are marked with an asterisk (*) to remind you to make sure that Num Lock is on when you use the numeric keypad.

Views

Result	Windows	Mac OS
Turn display color management on or off for active view	Shift+/ (on numeric keypad)	Shift+/ (on numeric keypad)
Show red, green, blue, or alpha channel as grayscale	Alt+1, Alt+2, Alt+3, Alt+4	Option+1, Option+2, Option+3, Option+4
Show colorized red, green, or blue channel	Alt+Shift+1, Alt+Shift+2, Alt+Shift+3	Option+Shift+1, Option+Shift+2, Option+Shift+3
Toggle showing straight RGB color	Alt+Shift+4	Option+Shift+4
Show alpha boundary (outline between transparent and opaque regions) in Layer panel	Alt+5	Option+5
Show alpha overlay (colored overlay on transparent regions) in Layer panel	Alt+6	Option+6
Show Refine Edge X-ray	Alt+X	Option+X
Center composition in the panel	Double-click Hand tool	Double-click Hand tool
Zoom-in in Composition, Layer, or Footage panel	. (period) on main keyboard	. (period) on main keyboard
Zoom-out in Composition, Layer, or Footage panel	, (comma)	, (comma)
Zoom to 100% in Composition, Layer, or Footage panel	/ (on main keyboard)	/ (on main keyboard)
Zoom to fit in Composition, Layer, or Footage panel	Shift+/ (on main keyboard)	Shift+/ (on main keyboard)
Zoom up to 100% to fit in Composition, Layer, or Footage panel	Alt+/ (on main keyboard)	Option+/ (on main keyboard)
Set resolution to Full, Half, or Custom in Composition panel	Ctrl+J, Ctrl+Shift+J, Ctrl+Alt+J	Command+J, Command+Shift+J, Command+Option+J
Open View Options dialog box for active Composition panel	Ctrl+Alt+U	Command+Option+U

Zoom in time	= (equal sign) on main keyboard	= (equal sign) on main keyboard
Zoom out time	- (hyphen) on main keyboard	- (hyphen) on main keyboard
Zoom in Timeline panel to single-frame units (Press again to zoom out to show entire composition duration.)	; (semicolon)	; (semicolon)
Zoom out in Timeline panel to show the entire composition duration (Press again to zoom back in to the duration specified by the Time Navigator.)	Shift+; (semicolon)	Shift+; (semicolon)
Prevent images from being rendered for previews in viewer panels	Caps Lock	Caps Lock
Show or hide safe zones	' (apostrophe)	' (apostrophe)
Show or hide grid	Ctrl+' (apostrophe)	Command+' (apostrophe)
Show or hide proportional grid	Alt+' (apostrophe)	Option+' (apostrophe)
Show or hide rulers	Ctrl+R	Command+R
Show or hide guides	Ctrl+; (semicolon)	Command+; (semicolon)
Turn snapping to grid on or off	Ctrl+Shift+' (apostrophe)	Command+Shift+' (apostrophe)
Turn snapping to guides on or off	Ctrl+Shift+; (semicolon)	Command+Shift+; (semicolon)
Lock or unlock guides	Ctrl+Alt+Shift+; (semicolon)	Command+Option+Shift+; (semicolon)
Show or hide layer controls (masks, motion paths, light and camera wireframes, effect control points, and layer handles)	Ctrl+Shift+H	Command+Shift+H

Footage

Result	Windows	Mac OS
Import one file or image sequence	Ctrl+I	Command+I
Import multiple files or image sequences	Ctrl+Alt+I	Command+Option+I
Open movie in an After Effects Footage panel	Double-click the footage item in the Project panel	Double-click the footage item in the Project panel
Add selected items to most recently activated composition	Ctrl+/ (on main keyboard)	Command+/ (on main keyboard)
Replace selected source footage for selected layers with footage item selected in Project panel	Ctrl+Alt+/ (on main keyboard)	Command+Option+/ (on main keyboard)
Replace source for a selected layer	Alt-drag footage item from Project panel onto selected layer	Option-drag footage item from Project panel onto selected layer
Delete a footage item without a warning	Ctrl+Backspace	Command+Delete
Open Interpret Footage dialog box for selected footage item	Ctrl+Alt+G	Command+Option+G
Remember footage interpretation	Ctrl+Alt+C	Command+Option+C
Edit selected footage item in application with which it's associated (Edit Original)	Ctrl+E	Command+E

Replace selected footage item	Ctrl+H	Command+H
Reload selected footage items	Ctrl+Alt+L	Command+Option+L
Set proxy for selected footage item	Ctrl+Alt+P	Command+Option+P

Effects and animation presets

Result	**Windows**	**Mac OS**
Delete all effects from selected layers	Ctrl+Shift+E	Command+Shift+E
Apply most recently applied effect to selected layers	Ctrl+Alt+Shift+E	Command+Option+Shift+E
Apply most recently applied animation preset to selected layers	Ctrl+Alt+Shift+F	Command+Option+Shift+F

Layers

Note:

Some operations do not affect shy layers.

Result	Windows	Mac OS
New solid layer	Ctrl+Y	Command+Y
New null layer	Ctrl+Alt+Shift+Y	Command+Option+Shift+Y
New adjustment layer	Ctrl+Alt+Y	Command+Option+Y
Select layer (1-999) by its number (enter digits rapidly for two-digit and three-digit numbers)	0-9 on numeric keypad*	0-9 on numeric keypad*
Toggle selection of layer (1-999) by its number (enter digits rapidly for two-digit and three-digit numbers)	Shift+0-9 on numeric keypad*	Shift+0-9 on numeric keypad*
Select next layer in stacking order	Ctrl+Down Arrow	Command+Down Arrow
Select previous layer in stacking order	Ctrl+Up Arrow	Command+Up Arrow
Extend selection to next layer in stacking order	Ctrl+Shift+Down Arrow	Command+Shift+Down Arrow
Extend selection to previous layer in stacking order	Ctrl+Shift+Up Arrow	Command+Shift+Up Arrow
Deselect all layers	Ctrl+Shift+A	Command+Shift+A
Scroll topmost selected layer to top of Timeline panel	X	X
Show or hide Parent column	Shift+F4	Shift+F4
Show or hide Layer Switches and Modes columns	F4	F4
Setting the sampling method for selected layers (Best/Bilinear)	Alt+B	Option+B
Setting the sampling method for selected layers (Best/Bicubic)	Alt+Shift+B	Option+Shift+B

Turn off all other solo switches	Alt-click solo switch	Option-click solo switch
Turn Video (eyeball) switch on or off for selected layers	Ctrl+Alt+Shift+V	Command+Option+Shift+V
Turn off Video switch for all video layers other than selected layers	Ctrl+Shift+V	Command+Shift+V
Open settings dialog box for selected solid, light, camera, null, or adjustment layer	Ctrl+Shift+Y	Command+Shift+Y
Paste layers at current time	Ctrl+Alt+V	Command+Option+V
Split selected layers. (If no layers are selected, split all layers.)	Ctrl+Shift+D	Command+Shift+D
Precompose selected layers	Ctrl+Shift+C	Command+Shift+C
Open Effect Controls panel for selected layers	Ctrl+Shift+T	Command+Shift+T
Open layer in Layer panel (opens source composition for precomposition layer in Composition panel)	Double-click a layer	Double-click a layer
Open source of a layer in Footage panel (opens precomposition layer in Layer panel)	Alt-double-click a layer	Option-double-click a layer
Reverse selected layers in time	Ctrl+Alt+R	Command+Option+R
Enable time remapping for selected layers	Ctrl+Alt+T	Command+Option+T
Move selected layers so that their In point or Out point is at the current time	[(left bracket) or] (right bracket)	[(left bracket) or] (right bracket)
Trim In point or Out point of selected layers to current time	Alt+[(left bracket) or Alt+] (right bracket)	Option+[(left bracket) or Option+] (right bracket)
Add or remove expression for a property	Alt-click stopwatch	Option-click stopwatch
Add an effect (or multiple selected effects) to selected layers	Double-click effect selection in Effects & Presets panel	Double-click effect selection in Effects & Presets panel
Set In point or Out point by time-stretching	Ctrl+Shift+, (comma) or Ctrl+Alt+, (comma)	Command+Shift+, (comma) or Command+Option+, (comma)
Move selected layers so that their In point is at beginning of composition	Alt+Home	Option+Home
Move selected layers so that their Out point is at end of composition	Alt+End	Option+End
Lock selected layers	Ctrl+L	Command+L
Unlock all layers	Ctrl+Shift+L	Command+Shift+L
Set Quality to Best, Draft, or Wireframe for selected layers	Ctrl+U, Ctrl+Shift+U, or Ctrl+Alt+Shift+U	Command+U, Command+Shift+U, Command+Option+Shift+U
Cycle forward or backward through blending modes for selected layers	Shift+- (hyphen) or Shift+= (equal sign) on the main keyboard	Shift+- (hyphen) or Shift+= (equal sign) on the main keyboard
Find in Timeline panel	Ctrl+F	Command+F

Note:

Some shortcuts are marked with an asterisk (*) to remind you to make sure that Num Lock is on when you use the numeric keypad.

Showing properties and groups in the Timeline panel

Note:

This table contains double-letter shortcuts (for example, LL). To use these shortcuts, press the letters in quick succession.

Result	Windows	Mac OS
Find in Timeline panel	Ctrl+F	Command+F
Toggle expansion of selected layers to show all properties	Ctrl+` (accent grave)	Command+` (accent grave)
Toggle expansion of property group and all child property groups to show all properties	Ctrl-click triangle to the left of the property group name	Command-click triangle to the left of the property group name
Show only Anchor Point property (for lights and cameras, Point Of Interest)	A	A
Show only Audio Levels property	L	L
Show only Mask Feather property	F	F
Show only Mask Path property	M	M
Show only Mask Opacity property	TT	TT
Show only Opacity property (for lights, Intensity)	T	T
Show only Position property	P	P
Show only Rotation and Orientation properties	R	R
Show only Scale property	S	S
Show only Time Remap property	RR	RR
Show only instances of missing effects	FF	FF
Show only Effects property group	E	E
Show only mask property groups	MM	MM
Show only Material Options property group	AA	AA
Show only expressions	EE	EE
Show properties with keyframes	U	U
Show only modified properties	UU	UU
Show only paint strokes, Roto Brush strokes, and Puppet pins	PP	PP
Show only audio waveform	LL	LL
Show only selected properties and groups	SS	SS
Hide property or group	Alt+Shift-click property or group name	Option+Shift-click property or group name
Add or remove property or group from set that is shown	Shift+property or group shortcut	Shift+property or group shortcut
Add or remove keyframe at current time	Alt+Shift+property shortcut	Option+property shortcut

Showing properties in the Effect Controls panel

Result	Windows	Mac OS
Toggle expansion of selected effects to show all properties	Ctrl+` (accent grave)	Command+` (accent grave)
Toggle expansion of property group and all child property groups to show all properties	Ctrl-click triangle to the left of the property group name	Command-click triangle to the left of the property group name

Modifying layer properties

Result	Windows	Mac OS
Modify property value by default increments	Drag property value	Drag property value
Modify property value by 10x default increments	Shift-drag property value	Shift-drag property value
Modify property value by 1/10 default increments	Ctrl-drag property value	Command-drag property value
Open Auto-Orientation dialog box for selected layers	Ctrl+Alt+O	Command+Alt+O
Open Opacity dialog box for selected layers	Ctrl+Shift+O	Command+Shift+O
Open Rotation dialog box for selected layers	Ctrl+Shift+R	Command+Shift+R
Open Position dialog box for selected layers	Ctrl+Shift+P	Command+Shift+P
Center-selected layers in view (modifies Position property to place anchor points of selected layers in center of current view)	Ctrl+Home	Command+Home
Center anchor point in the visible content	Ctrl+Alt+Home	Command+Option+Home
Move selected layers 1 pixel at current magnification (Position)	Arrow key	Arrow key
Move selected layers 10 pixels at current magnification (Position)	Shift+arrow key	Shift+arrow key
Move selected layers 1 frame earlier or later	Alt+Page Up or Alt+Page Down	Option+Page Up or Option+Page Down
Move selected layers 10 frames earlier or later	Alt+Shift+Page Up or Alt+Shift+Page Down	Option+Shift+Page Up or Option+Shift+Page Down
Increase or decrease Rotation (Z Rotation) of selected layers by 1°	+ (plus) or - (minus) on numeric keypad	+ (plus) or - (minus) on numeric keypad
Increase or decrease Rotation (Z Rotation) of selected layers by 10°	Shift++ (plus) or Shift+- (minus) on numeric keypad	Shift++ (plus) or Shift+- (minus) on numeric keypad
Increase or decrease Opacity (or Intensity for light layers) of selected layers by 1%	Ctrl+Alt++ (plus) or Ctrl+Alt+- (minus) on numeric keypad	Control+Option++ (plus) or Control+Option+- (minus) on numeric keypad
Increase or decrease Opacity (or Intensity for light layers) of selected layers by 10%	Ctrl+Alt+Shift++ (plus) or Ctrl+Alt+Shift+- (minus) on numeric keypad	Control+Option+Shift++ (plus) or Control+Option+Shift+- (minus) on numeric keypad
Increase Scale of selected layers by 1%	Ctrl++ (plus) or Alt++ (plus) on numeric keypad	Command++ (plus) or Option++ (plus) on numeric keypad
Decrease Scale of selected layers by 1%	Ctrl+- (minus) or Alt+- (minus) on numeric keypad	Command+- (minus) or Option+- (minus) on numeric keypad

Increase Scale of selected layers by 10%	Ctrl+Shift++ (plus) or Alt+Shift++ (plus) on numeric keypad	Command+Shift++ (plus) or Option+Shift++ (plus) on numeric keypad
Decrease Scale of selected layers by 10%	Ctrl+Shift+- (minus) or Alt+Shift+- (minus) on numeric keypad	Command+Shift+- (minus) or Option+Shift+- (minus) on numeric keypad
Modify Rotation or Orientation in 45° increments	Shift-drag with Rotation tool	Shift-drag with Rotation tool
Modify Scale, constrained to footage frame aspect ratio	Shift-drag layer handle with Selection tool	Shift-drag layer handle with Selection tool
Reset Rotation to 0°	Double-click Rotation tool	Double-click Rotation tool
Reset Scale to 100%	Double-click Selection tool	Double-click Selection tool
Scale and reposition selected layers to fit composition	Ctrl+Alt+F	Command+Option+F
Scale and reposition selected layers to fit composition width, preserving image aspect ratio for each layer	Ctrl+Alt+Shift+H	Command+Option+Shift+H
Scale and reposition selected layers to fit composition height, preserving image aspect ratio for each layer	Ctrl+Alt+Shift+G	Command+Option+Shift+G

3D layers

Note:

(Mac OS) Shortcuts involving function keys F9-F12 may conflict with shortcuts used by the operating system. See Mac OS Help for instructions to reassign Dashboard & Expose shortcuts.

Result	Windows	Mac OS
Switch to 3D view 1 (defaults to Front)	F10	F10
Switch to 3D view 2 (defaults to Custom View 1)	F11	F11
Switch to 3D view 3 (defaults to Active Camera)	F12	F12
Return to previous view	Esc	Esc
New light	Ctrl+Alt+Shift+L	Command+Option+Shift+L
New camera	Ctrl+Alt+Shift+C	Command+Option+Shift+C
Move the camera and its point of interest to look at selected 3D layers	Ctrl+Alt+Shift+\	Command+Option+Shift+\
With a camera tool selected, move the camera and its point of interest to look at selected 3D layers	F	F
With a camera tool selected, move the camera and its point of interest to look at all 3D layers	Ctrl+Shift+F	Command+Shift+F
Turn Casts Shadows property on or off for selected 3D layers	Alt+Shift+C	Option+Shift+C

Keyframes and the Graph Editor

Note:

(Mac OS) Shortcuts involving function keys F9-F12 may conflict with shortcuts used by the operating system. See Mac OS Help for instructions to reassign Dashboard & Expose shortcuts.

Result	Windows	Mac OS
Toggle between Graph Editor and layer bar modes	Shift+F3	Shift+F3
Select all keyframes for a property	Click property name	Click property name
Select all visible keyframes and properties	Ctrl+Alt+A	Command+Option+A
Deselect all keyframes, properties, and property groups	Shift+F2 or Ctrl+Alt+Shift+A	Shift+F2 or Command+Option+Shift+A
Move keyframe 1 frame later or earlier	Alt+Right Arrow or Alt+Left Arrow	Option+Right Arrow or Option+Left Arrow
Move keyframe 10 frames later or earlier	Alt+Shift+Right Arrow or Alt+Shift+Left Arrow	Option+Shift+Right Arrow or Option+Shift+Left Arrow
Set interpolation for selected keyframes (layer bar mode)	Ctrl+Alt+K	Command+Option+K
Set keyframe interpolation method to hold or Auto Bezier	Ctrl+Alt+H	Command+Option+H
Set keyframe interpolation method to linear or Auto Bezier	Ctrl-click in layer bar mode	Command-click in layer bar mode
Set keyframe interpolation method to linear or hold	Ctrl+Alt-click in layer bar mode	Command+Option-click in layer bar mode
Easy ease selected keyframes	F9	F9
Easy ease selected keyframes in	Shift+F9	Shift+F9
Easy ease selected keyframes out	Ctrl+Shift+F9	Command+Shift+F9
Set velocity for selected keyframes	Ctrl+Shift+K	Command+Shift+K
Add or remove keyframe at current time. For property shortcuts, see Showing properties and groups in the Timeline panel.	Alt+Shift+property shortcut	Option+property shortcut

Text

Result	Windows	Mac OS
New text layer	Ctrl+Alt+Shift+T	Command+Option+Shift+T
Align selected horizontal text left, center, or right	Ctrl+Shift+L, Ctrl+Shift+C, or Ctrl+Shift+R	Command+Shift+L, Command+Shift+C, or Command+Shift+R
Align selected vertical text top, center, or bottom	Ctrl+Shift+L, Ctrl+Shift+C, or Ctrl+Shift+R	Command+Shift+L, Command+Shift+C, or Command+Shift+R
Extend or reduce selection by one character to right or left in horizontal text	Shift+Right Arrow or Shift+Left Arrow	Shift+Right Arrow or Shift+Left Arrow
Extend or reduce selection by one word to right or left in horizontal text	Ctrl+Shift+Right Arrow or Ctrl+Shift+Left Arrow	Command+Shift+Right Arrow or Command+Shift+Left Arrow

Extend or reduce selection by one line up or down in horizontal text	Shift+Up Arrow or Shift+Down Arrow	Shift+Up Arrow or Shift+Down Arrow
Extend or reduce selection by one line to right or left in vertical text	Shift+Right Arrow or Shift+Left Arrow	Shift+Right Arrow or Shift+Left Arrow
Extend or reduce selection one word up or down in vertical text	Ctrl+Shift+Up Arrow or Ctrl+Shift+Down Arrow	Command+Shift+Up Arrow or Command+Shift+Down Arrow
Extend or reduce selection by one character up or down in vertical text	Shift+Up Arrow or Shift+Down Arrow	Shift+Up Arrow or Shift+Down Arrow
Select text from insertion point to beginning or end of line	Shift+Home or Shift+End	Shift+Home or Shift+End
Move insertion point to beginning or end of line	Home or End	Home or End
Select all text on a layer	Double-click text layer	Double-click text layer
Select text from insertion point to beginning or end of text frame	Ctrl+Shift+Home or Ctrl+Shift+End	Command+Shift+Home or Command+Shift+End
To mouse-click point, select text from insertion point	Shift-click	Shift-click
In horizontal text, move insertion point one character left or right; one line up or down; one word left or right; or one paragraph up or down	Left Arrow or Right Arrow; Up Arrow or Down Arrow; Ctrl+Left Arrow or Ctrl+Right Arrow; or Ctrl+Up Arrow or Ctrl+Down Arrow	Left Arrow or Right Arrow; Up Arrow or Down Arrow; Command+Left Arrow or Command+Right Arrow; or Command+Up Arrow or Command+Down Arrow
In vertical text, move insertion point one character up or down; one left or right; one word up or down; or one paragraph left or right	Up Arrow or Down Arrow; Left Arrow or Right Arrow; Ctrl+Up Arrow or Ctrl+Down Arrow; or Ctrl+Left Arrow or Ctrl+Right Arrow	Up Arrow or Down Arrow; Left Arrow or Right Arrow; Command+Up Arrow or Command+Down Arrow; or Command+Left Arrow or Command+Right Arrow
Select word, line, paragraph, or entire text frame	Double-click, triple-click, quadruple-click, or quintuple-click with Type tool	Double-click, triple-click, quadruple-click, or quintuple-click with Type tool
Turn All Caps on or off for selected text	Ctrl+Shift+K	Command+Shift+K
Turn Small Caps on or off for selected text	Ctrl+Alt+Shift+K	Command+Option+Shift+K
Turn Superscript on or off for selected text	Ctrl+Shift+= (equal sign)	Command+Shift+= (equal sign)
Turn Subscript on or off for selected text	Ctrl+Alt+Shift+= (equal sign)	Command+Option+Shift+= (equal sign)
Set horizontal scale to 100% for selected text	Ctrl+Shift+X	Command+Shift+X
Set vertical scale to 100% for selected text	Ctrl+Alt+Shift+X	Command+Option+Shift+X
Auto leading for selected text	Ctrl+Alt+Shift+A	Command+Option+Shift+A
Reset tracking to 0 for selected text	Ctrl+Shift+Q	Command+Shift+Control+Q
Justify paragraph; left align last line	Ctrl+Shift+J	Command+Shift+J
Justify paragraph; right align last line	Ctrl+Alt+Shift+J	Command+Option+Shift+J
Justify paragraph; force last line	Ctrl+Shift+F	Command+Shift+F
Decrease or increase font size of selected text by 2 units	Ctrl+Shift+, (comma) or Ctrl+Shift+. (period)	Command+Shift+, (comma) or Command+Shift+. (period)
Decrease or increase font size of selected text by 10 units	Ctrl+Alt+Shift+, (comma) or Ctrl+Alt+Shift+. (period)	Command+Option+Shift+, (comma) or Command+Option+Shift+. (period)
Increase or decrease leading by 2 units	Alt+Down Arrow or Alt+Up Arrow	Option+Down Arrow or Option+Up Arrow

Increase or decrease leading by 10 units	Ctrl+Alt+Down Arrow or Ctrl+Alt+Up Arrow	Command+Option+Down Arrow or Command+Option+Up Arrow
Decrease or increase baseline shift by 2 units	Alt+Shift+Down Arrow or Alt+Shift+Up Arrow	Option+Shift+Down Arrow or Option+Shift+Up Arrow
Decrease or increase baseline shift by 10 units	Ctrl+Alt+Shift+Down Arrow or Ctrl+Alt+Shift+Up Arrow	Command+Option+Shift+Down Arrow or Command+Option+Shift+Up Arrow
Decrease or increase kerning or tracking 20 units (20/1000 ems)	Alt+Left Arrow or Alt+Right Arrow	Option+Left Arrow or Option+Right Arrow
Decrease or increase kerning or tracking 100 units (100/1000 ems)	Ctrl+Alt+Left Arrow or Ctrl+Alt+Right Arrow	Command+Option+Left Arrow or Command+Option+Right Arrow
Toggle paragraph composer	Ctrl+Alt+Shift+T	Command+Option+Shift+T

Masks

Result	Windows	Mac OS
New mask	Ctrl+Shift+N	Command+Shift+N
Select all points in a mask	Alt-click mask	Option-click mask
Select next or previous mask	Alt+` (accent grave) or Alt+Shift+` (accent grave)	Option+` (accent grave) or Option+Shift+` (accent grave)
Enter free-transform mask editing mode	Double-click mask with Selection tool or select mask in Timeline panel and press Ctrl+T	Double-click mask with Selection tool or select mask in Timeline panel and press Command+T
Exit free-transform mask editing mode	Esc	Esc
Scale around center point in Free Transform mode	Ctrl-drag	Command-drag
Move selected path points 1 pixel at current magnification	Arrow key	Arrow key
Move selected path points 10 pixels at current magnification	Shift+arrow key	Shift+arrow key
Toggle between smooth and corner points	Ctrl+Alt-click vertex	Command+Option-click vertex
Redraw Bezier handles	Ctrl+Alt-drag vertex	Command+Option-drag vertex
Invert selected mask	Ctrl+Shift+I	Command+Shift+I
Open Mask Feather dialog box for selected mask	Ctrl+Shift+F	Command+Shift+F
Open Mask Shape dialog box for selected mask	Ctrl+Shift+M	Command+Shift+M
Subtract mode	S	S
Darken mode	D	D
Difference mode	F	F
Add mode	A	S
Intersect mode	I	I
None	N	N

Paint tools

Result	Windows	Mac OS
Swap paint background color and foreground colors	X	X
Set paint foreground color to black and background color to white	D	D
Set foreground color to the color currently under any paint tool pointer	Alt-click	Option-click
Set foreground color to the average color of a 4-pixel x 4-pixel area under any paint tool pointer	Ctrl+Alt-click	Command+Option-click
Set brush size for a paint tool	Ctrl-drag	Command-drag
Set brush hardness for a paint tool	Ctrl-drag, then release Ctrl while dragging	Command-drag, then release Command while dragging
Join current paint stroke to the previous stroke	Hold Shift while beginning stroke	Hold Shift while beginning stroke
Set starting sample point to point currently under Clone Stamp tool pointer	Alt-click	Option-click
Momentarily activate Eraser tool with Last Stroke Only option	Ctrl+Shift	Command+Shift
Show and move overlay (change Offset value of aligned Clone Stamp tool or change Source Position value of unaligned Clone Stamp tool)	Alt+Shift-drag with Clone Stamp tool	Option+Shift-drag with Clone Stamp tool
Activate a specific Clone Stamp tool preset	3, 4, 5, 6, or 7 on the main keyboard	3, 4, 5, 6, or 7 on the main keyboard
Duplicate a Clone Stamp tool preset in Paint panel	Alt-click the button for the preset	Option-click the button for the preset
Set opacity for a paint tool	Digit on numeric keypad (for example, 9=90%, 1=10%)*	Digit on numeric keypad (for example, 9=90%, 1=10%)*
Set opacity for a paint tool to 100%	. (decimal) on numeric keypad*	. (decimal) on numeric keypad*
Set flow for a paint tool	Shift+ a digit on numeric keypad (for example, 9=90%, 1=10%)*	Shift+ a digit on numeric keypad (for example, 9=90%, 1=10%)*
Set flow for a paint tool to 100%	Shift+. (decimal) on numeric keypad*	Shift+. (decimal) on numeric keypad*
Move earlier or later by number of frames specified for stroke Duration	Ctrl+Page Up or Ctrl+Page Down (or 1 or 2 on the main keyboard)	Command+Page Up or Command+Page Down (or 1 or 2 on the main keyboard)

Note:

Some shortcuts are marked with an asterisk (*) to remind you to make sure that Num Lock is on when you use the numeric keypad.

Shape layers

Result	Windows	Mac OS
Group selected shapes	Ctrl+G	Command+G
Ungroup selected shapes	Ctrl+Shift+G	Command+Shift+G
Enter free-transform path editing mode	Select Path property in Timeline panel and press Ctrl+T	Select Path property in Timeline panel and press Command+T
Increase star inner roundness	Page Up when dragging to create shape	Page Up when dragging to create shape
Decrease star inner roundness	Page Down when dragging to create shape	Page Down when dragging to create shape
Increase number of points for star or polygon; increase roundness for rounded rectangle	Up Arrow when dragging to create shape	Up Arrow when dragging to create shape
Decrease number of points for star or polygon; decrease roundness for rounded rectangle	Down Arrow when dragging to create shape	Down Arrow when dragging to create shape
Reposition shape during creation	Hold spacebar when dragging to create shape	Hold spacebar when dragging to create shape
Set rounded rectangle roundness to 0 (sharp corners); decrease polygon and star outer roundness	Left Arrow when dragging to create shape	Left Arrow when dragging to create shape
Set rounded rectangle roundness to maximum; increase polygon and star outer roundness	Right Arrow when dragging to create shape	Right Arrow when dragging to create shape
Constrain rectangles to squares; constrain ellipses to circles; constrain polygons and stars to zero rotation	Shift when dragging to create shape	Shift when dragging to create shape
Change outer radius of star	Ctrl when dragging to create shape	Command when dragging to create shape

Markers

Result	Windows	Mac OS
Set marker at current time (works during preview and audio-only preview)	* (multiply) on numeric keypad	* (multiply) on numeric keypad or Control+8 on main keyboard
Set marker at current time and open marker dialog box	Alt+* (multiply) on numeric keypad	Option+* (multiply) on numeric keypad or Control+Option+8 on main keyboard
Set and number a composition marker (0-9) at the current time	Shift+0-9 on main keyboard	Shift+0-9 on main keyboard
Go to a composition marker (0-9)	0-9 on main keyboard	0-9 on main keyboard
Display the duration between two layer markers or keyframes in the Info panel	Alt-click the markers or keyframes	Option-click the markers or keyframes
Remove marker	Ctrl-click marker	Command-click marker

Motion tracking

Result	Windows	Mac OS
Move feature region, search region, and attach point 1 pixel at current magnification	Arrow key	Arrow key
Move feature region, search region, and attach point 10 pixels at current magnification	Shift+arrow key	Shift+arrow key
Move feature region and search region 1 pixel at current magnification	Alt+arrow key	Option+arrow key
Move feature region and search region 10 pixels at current magnification	Alt+Shift+arrow key	Option+Shift+arrow key

Saving, exporting, and rendering

Result	Windows	Mac OS
Save project	Ctrl+S	Command+S
Increment and save project	Ctrl+Alt+Shift+S	Command+Option+Shift+S
Save As	Ctrl+Shift+S	Command+Shift+S
Add active composition or selected items to render queue	Ctrl+Shift+/ (on main keyboard)	Command+Shift+/ (on main keyboard)
Add current frame to render queue	Ctrl+Alt+S	Command+Option+S
Duplicate render item with same output filename as original	Ctrl+Shift+D	Command+Shift+D
Add a composition to the Adobe Media Encoder encoding queue	Ctrl+Alt+M	Cmd+Option+M

Note:

*On Mac OS, some keyboard commands used to interact with the operating system conflict with keyboard commands for interacting with After Effects. Select **Use System Shortcut Keys** in the **General** preferences to override the After Effects keyboard command sometimes in which there's a conflict with the Mac OS keyboard command.*

Keyboard shortcuts PDF

Click the link below to download a PDF of about 50 of the more commonly used and pouplar keyboard shortcuts.

After Effects system requirements

Applicable for: November 2019 (17.0)

System requirements for earlier releases: After Effects CC system requirements | June 2019 (16.1.2) and April 2019 (16.1 and 16.1.1) releases.

Minimum system requirements for After Effects

Windows

	Minimum specifications
Processor	Multicore Intel processor with 64-bit support
Operating system	Microsoft Windows 10 (64 bit) versions 1703 (Creators Update) and later
RAM	16 GB minimum (32 GB recommended)
GPU	2GB of GPU VRAM. Adobe strongly recommends updating to NVIDIA driver 430.86 or later when using After Effects. Drivers prior to this have a known issue which can lead to a crash.
Hard disk space	5GB of available hard-disk space; additional free space required during installation (cannot install on removable flash storage devices) Additional disk space for disk cache (10GB recommended)
Monitor resolution	1280x1080 or greater display resolution
Internet	Internet connection and registration are necessary for required software activation, validation of subscriptions, and access to online services.*

macOS

	Minimum specifications
Processor	Multicore Intel processor with 64-bit support
Operating system	macOS versions 10.13 and later. Note: macOS version 10.12 is not supported
RAM	16 GB minimum (32 GB recommended)
GPU	2GB of GPU VRAM. Adobe strongly recommends updating to NVIDIA driver 430.86 or later when using After Effects. Drivers prior to this have a known issue which can lead to a crash.
Hard disk space	6GB of available hard-disk space for installation; additional free space required during installation (cannot install on a volume that uses a case-sensitive file system or on removable flash storage devices) Additional disk space for disk cache (10GB recommended)
Monitor resolution	1440x900 or greater display resolution
Internet	Internet connection and registration are necessary for required software activation, validation of subscriptions, and access to online services.*

*NOTICE TO USERS: Internet connection, Adobe ID, and acceptance of license agreement required to activate and use this product. This product may integrate with or allow access to certain Adobe or third-party hosted online services. Adobe services are available only to users 13 and older and require agreement to additional terms of use and the Adobe Privacy Policy (see http://www.adobe.com/legal.html). Applications and services may not be available in all countries or languages and may be subject to change or discontinuation without notice. Additional fees or membership charges may apply.

VR system requirements

Head Mounted Display (HMD)	Operating system
Oculus Rift	Windows 10
Windows Mixed Reality	Windows 10
HTC Vive	• Windows 10 • 27″ iMac with Radeon Pro graphics • iMac Pro with Radeon Vega graphics • Mac OS 10.13.3 or later

For detailed requirements for the different types of head-sets, and for information on setting up an immersive environment for After Effects, see Adobe Immersive Environment in After Effects.

Note:

NVIDIA has publicly released windows ODE drivers that support the CUDA 9.2 SDK used in the latest release of After Effects. This is not the Microsoft default driver, but you can download this driver directly from NVIDIA, Version 411.63 (of the 410 series drivers).

Language versions available for After Effects

Adobe After Effects is available in the following languages:

Deutsch English Español Français Italiano

Português (Brasil) Русский ??? ???

????

After Effects supports text composition in Middle Eastern as well as Indic scripts using the “South Asian and Middle Eastern” text engine.

Workflows

General workflow in After Effects

Overview of general workflow in After Effects

Whether you use Adobe After Effects to animate a simple title, create complex motion graphics, or composite realistic visual effects, you generally follow the same basic workflow, though you may repeat or skip some steps. For example, you may repeat the cycle of modifying layer properties, animating, and previewing until everything looks right. You may skip the step of importing footage if you intend to create graphical elements entirely in After Effects.

1. Import and organize footage

After you create a project, import your footage into the project in the Project panel. After Effects automatically interprets many common media formats, but you can also specify how you want After Effects to interpret attributes such as frame rate and pixel aspect ratio. You can view each item in a Footage panel and set its start and end times to fit your composition. For more information, see Importing and interpreting footage items.

2. Create, arrange, and composite layers in a composition

Create one or more compositions. Any footage item can be the source for one or more layers in a composition. You can arrange the layers spatially in the Composition panel or arrange them in time using the Timeline panel. You can stack layers in two dimensions or arrange them in three dimensions. You can use masks, blending modes, and keying tools to composite (combine), the images of multiple layers. You can even use shape layers, text layers, and paint tools to create your own visual elements. For more information, see Composition basics, Creating layers, Compositing and transparency overview and resources, Overview of shape layers, paths, and vector graphics, and Creating and editing text layers.

3. Modify and animate layer properties

You can modify any property of a layer, such as size, position, and opacity. You can make any combination of layer properties change over time, using keyframes and expressions. Use motion tracking to stabilize motion or to animate one layer so that it follows the motion in another layer. For more information, see Animation basics, Expression basics, and Tracking and stabilizing motion.

4. Add effects and modify effect properties

You can add any combination of effects to alter the appearance or sound of a layer, and even generate visual elements from scratch. You can apply any of the hundreds of effects, animation presets, and layer styles. You can even create and save your own animation presets. You can animate effect properties, too, which are simply layer properties within an effect property group. For more information, see Effects and animation presets overview.

5. Preview

Previewing compositions on your computer monitor or an external video monitor is fast and convenient, even for complex projects. You can change the speed and quality of previews by specifying their resolution and frame rate, and by limiting the area and duration of the composition that you preview. You can use color management features to preview how your movie will look on another output device. For more information, see Previewingand Color management.

6. Render and export

Add one or more compositions to the render queue to render them at the quality settings you choose and to create movies in the formats that you specify. You can use **File > Export** or **Composition > Add to Render Queue**.

For more information, see Basics of rendering and exporting section in Adobe Media Encoder.

Online resources for general workflow in After Effects

Read a basic step-by-step introduction to the general workflow in an excerpt from After Effects Classroom in a Book.

Read Trish and Chris Meyer's step-by-step introduction to creating a basic animation in a PDF excerpt from their book, The After Effects Apprentice.

For an overview of After Effects project navigtion, see the video tutorial, "Walking Through A Mini Project," by Jeff Sengstack and Infinite Skills.

Basic workflow tutorial: Create a simple movie

This tutorial assumes that you have already started After Effects and have not modified the empty default project. This example skips the step of importing footage and shows you instead how to create your own synthetic visual elements. After you have rendered a final movie, you can import it into After Effects to view it and use it as you would any other footage item.

Some people prefer to use the mouse and menus to interact with After Effects, whereas others prefer to use keyboard shortcuts for common tasks. For several steps in this example, two alternative commands are shown that produce the same result—the first demonstrating the discoverability of menu commands and the second demonstrating the speed and convenience of keyboard shortcuts. You'll likely find that you use some combination of keyboard shortcuts and menu commands in your work.

1. Create a new composition:
   - Choose Composition > New Composition.
   - Press Ctrl+N (Windows) or Command+N (Mac OS).
2. Change the Duration value in the Composition Settings dialog box by entering *5.00* (5 seconds), choose Web Video from the Preset menu, and click OK.
3. Create a new text layer:
   - Choose Layer > New > Text.
   - Press Ctrl+Alt+Shift+T (Windows) or Command+Option+Shift+T (Mac OS).
4. Type your name. Press Enter on the numeric keypad or press Ctrl+Enter (Windows) or Command+Return (Mac OS) on the main keyboard to exit text-editing mode.
5. Set an initial keyframe for the Position property:
   - Click the triangle to the left of the layer name in the Timeline panel, click the triangle to the left of the Transform group name, and then click the stopwatch button to the left of the Position property name.
   - Press Alt+Shift+P (Windows) or Option+Shift+P (Mac OS).
6. Activate the Selection tool:
   - Click the Selection Tool button in the Tools panel.
   - Press V.
7. Using the Selection tool, drag your text to the bottom-left corner of the frame in the Composition panel.
8. Move the current-time indicator to the last frame of the composition:
   - Drag the current-time indicator in the Timeline panel to the far right of the timeline.
   - Press End.
9. Using the Selection tool, drag your text to the top-right corner of the frame in the Composition panel.

   A new keyframe is created at this time for the Position property. Motion is interpolated between keyframe values.

10 Preview your animation using preview:

- Click the Play button in the Preview panel. Click Play again to stop the preview.
- Press the spacebar. Press the spacebar again to stop the preview.

11 Apply the Glow effect:

- Choose Effect > Stylize > Glow.
- Type *glow* in the search field at the top of the Effects & Presets panel to find the Glow effect. Double-click the effect name.

12 In the Render Queue panel, click the underlined text to the right of Output To. In the Output Movie To dialog box, choose a name and location for the output movie file, and then click Save. For the location, choose something easy to find, like your desktop.

13 Click the Render button to process all items in the render queue. The Render Queue panel shows the progress of the rendering operation. A sound is generated when rendering is complete.

You've created, rendered, and exported a movie.

You can import the movie that you've created and preview it in After Effects, or you can navigate to the movie and play it using a movie player such as QuickTime Player or Windows Media Player.

After Effects manual (PDF)

Find a PDF of articles to learn how to use After Effects.

After Effects manual (PDF)

Chapter 2: Workspaces

Planning and setup

Planning your work

Correct project settings, preparation of footage, and initial composition settings can help you to avoid errors and unexpected results when rendering your final output movie. Before you begin, think about the kind of work you intend to do in After Effects and the kind of output you plan to create. After you have planned your project and made some basic decisions about project settings, you are ready to start importing footage and assembling compositions from layers based on that footage.

The best way to ensure that your movie is suitable for a specific medium is to render a test movie and view it using the same type of equipment as your audience. It's best to do such tests before you have completed the difficult and time-consuming parts of your work, to uncover problems early.

Aharon Rabinowitz provides an article on the Creative COW website about planning your project with the final delivery specifications in mind.

For more information about encoding and compression options, see this FAQ entry: "FAQ: What is the best format for rendering and exporting from After Effects?"

Storyboards and scripts (screenplays)

Your movie or video production project often starts with the pre-production tasks of writing a script (screenplay) and creating storyboards, which then effectively guide you through your production (shooting) and post-production (editing, soundtrack, visual effects, and so on) stages.

You can use Adobe Story to collaboratively write and manage screenplays and dynamically generate shooting scripts, shooting schedules, character lists, shot lists, and more from your script using metadata. You can also generate specific metadata-based reports during the editing phase from Adobe Story. Adobe Photoshop and Adobe Illustrator help you create storyboards based on your script for shooting your movie or video.

Acquiring, choosing, and preparing footage

Before importing footage, first decide which media and formats to use for your finished movies, and then determine the best settings for your source material. Often, it's best to prepare footage before importing it into After Effects.

For example, if you want an image to fill your composition frame, configure the image in Adobe Photoshop so that the image size and pixel aspect ratio match the composition size and pixel aspect ratio. If the image is too large when you import it into After Effects, you increase the memory and processor requirements of the compositions that use it. If the image is too small, you lose image quality when you scale it to the desired size. See Pixel aspect ratio and frame aspect ratio.

If you can shoot footage with consistent lighting and colors—and otherwise prevent the need to do tedious utility work in post-production—then you have more time for creative work.

If possible, use uncompressed footage or footage encoded with lossless compression. Lossless compression produces better results for operations, such as keying and motion tracking because the compression is reversible, whereas lossy compression discards some data that cannot be restored (generation loss). Certain kinds of compression—such as the compression used in MPEG-2 or MPEG-4 camera formats—are especially bad for color keying, because they discard the subtle differences in color that you depend on for good bluescreen or greenscreen keying. It's often best to wait until the final rendering phase to use compression other than lossless compression. See Keying introduction and resources.

If possible, use footage with a frame rate that matches that of your output, so that After Effects doesn't have to use frame blending or similar methods to fill in missing frames. See Frame rate.

The kind of work that you do in After Effects and the kind of output movie that you want to create can even influence how you shoot and acquire your footage. For example, if you know that you want to animate using motion tracking, consider shooting your scene in a manner that optimizes for motion tracking—for example, using tracking markers. See Motion tracking workflows.

Also consider shooting at a larger frame size than what you need for final delivery if you want "head-room" for post-production, whether for fake pans and zooms, or for stabilization.

Project settings

Project settings fall into three basic categories: how time is displayed in the project, how color data is treated in the project, and what sampling rate to use for audio. Of these settings, it is important to think about the color settings before you do much work in your project, because they determine how color data is interpreted as you import footage files, how color calculations are performed as you work, and how color data is converted for final output. See Color managementand Timecode and time display units.

If you enable color management for your project, the colors that you see are the same colors that your audience see when they view the movie that you create.

Note:

Click the color depth indicator at the bottom of the Project panel to open the Project Settings dialog box. Alt-click (Windows) or Option-click (Mac OS) to cycle through color bit depths: 8 bpc, 16 bpc, and 32 bpc. See Color depth and high dynamic range color.

Composition settings

After you prepare and import footage items, you use these footage items to create layers in a composition, where you animate and apply effects. When you create a composition, specify composition settings such as resolution, frame size, and pixel aspect ratio for your final rendered output. Although you can change composition settings at any time, it's best to set them correctly as you create each composition to avoid unexpected results in your final rendered output. For example, the composition frame size should be the image size in the playback medium. See Composition settings.

If you are rendering and exporting a composition to more than one media format, always match the pixel dimensions for your composition to the largest pixel dimensions used for your output. Later, you can use output modules in the Render Queue panel to encode and export a separate version of the composition for each format. See Output modules and output module settings.

Performance, memory, and storage considerations

If you work with large compositions, make sure that you configure After Effects and your computer to maximize performance. Complex compositions can require a large amount of memory to render, and the rendered movies can take a large amount of disk space to store. Before you attempt to render a three-hour movie, make sure that you have the disk space available to store it. See Storage requirements for output files.

If your source footage files are on a slow disk drive (or across a slow network connection), then performance is affected. When possible, keep the source footage files for your project on a fast local disk drive. Ideally, you have three drives: one for source footage files, one from which the application runs, and one for rendered output.

For more information, see Improve performanceand Memory & Multiprocessing preferences.

Planning for playback on computer monitors and mobile devices

When you create a movie for playback on a computer or a mobile device—whether downloaded from the Web, played from a media drive, or streamed from a site—specify composition settings, render settings, and output module settings that keep file size low without compromising on the intended delivery quality. Consider that a movie with a high data rate may not play well on older devices. Similarly, a large movie may take a long time to download over a slower data network.

When rendering your final movie, choose a file type and encoder appropriate for the final media. The corresponding decoder must be available on the system used by your intended audience; otherwise they will not be able to play the movie. Common codecs (encoders/decoders) include the codecs installed with media players such as Flash Player, Windows Media Player, and QuickTime Player.

Adobe Media Encoder CC offers presets that contain predefined settings for various platforms and formats for mobile devices, broadcast, cinema, web video, and so on. For more details about Media Encoder presets, see Using the Preset Browser.

For more information on rendering and exporting in After Effects, see Basics of rendering and exporting.

The article Exporting for the Web and mobile devices covers some important tips related to exporting your videos for Web and mobile devices.

For more information about encoding and compression options for After Effects, see this FAQ entry: "FAQ: What is the best format for rendering and exporting from After Effects?"

Mobile devices

Many of the considerations for creating movies for playback on mobile devices, such as mobile phones and tablets, are similar to the considerations for creating movies for playback on computers—but the limitations are even more extreme. Because the amount of storage (disk space) and processor power can vary for mobile phones, file size and data rate for movies must be even more tightly controlled.

Screen dimensions, video frame rates, and color gamuts vary greatly from one mobile device to another.

Use these tips when shooting video for mobile devices:

- Tight shots are better. It's hard to see a face on a tiny screen unless it's shot in relative close-up.
- Light your subjects well, and keep them separated from the background; keep the colors and brightness values between background and subject different.
- Avoid excessive zooming and rolling, which hinder temporal compression schemes.

- Because stable (non-shaky) video is easier to compress, shoot video with a tripod to minimize the shaking of the camera.
- Avoid using auto-focus and auto-exposure features. When these features engage, they change the appearance of all of the pixels in an image from one frame to the next, making compression using interframe encoding schemes less efficient.

Use these tips when working in After Effects (for mobile devices):

- Use a lower frame rate (12-24 fps) for mobile devices.
- Use motion-stabilization tools and noise-reduction or blur effects before rendering to final output, to aid the compressor in reducing file size.
- Match the color palette to the mobile devices that you are targeting. Mobile devices, in general, have a limited color gamut.
- Consider using cuts and other fast transitions instead of zooming in and out or using fades and dissolves. Fast cuts also make compression easier.

Cross-platform project considerations

After Effects project files are compatible with Mac OS and Windows operating systems, but some factors—mostly regarding the locations and naming of footage files and support files—can affect the ease of working with the same project across platforms.

Project file paths

When you move a project file to a different computer and open it, After Effects attempts to locate the project's footage files as follows: After Effects first searches the folder in which the project file is located; second, it searches the file's original path or folder location; finally, it searches the root of the directory where the project is located.

If you are building cross-platform projects, it's best if the full paths have the same names on Mac OS and Windows systems. If the footage and the project are on different volumes, make sure that the appropriate volume is mounted before opening the project and that network volume names are the same on both systems.

It's best to store footage in the same folder as the project file or in another folder within that folder. Here's a sample hierarchy:

/newproject/project_file.aep

/newproject/source/footage1.psd

/newproject/source/footage2.avi

You can then copy the new project folder in its entirety across platforms, and After Effects properly locates all the footage.

Use the Collect Files feature to gather copies of all the files in a project into a single folder. You can then move the folder containing the copied project to the other platform. See Collect files in one location.

File-naming conventions

Name your footage and project files with the appropriate filename extensions, such as .mov for QuickTime movies and *.aep* for After Effects projects. For using files on the Web, be sure that filenames adhere to applicable conventions for extensions and paths.

Supported file types

Some file types are supported on one platform but not others. See Supported import formatsand Supported output formats.

Resources

Ensure that all fonts, effects, codecs, and other resources are available on both systems. Such resources are often plug-ins.

If you use a native After Effects effect in a project on one operating system, the effect still works on the other operating system to which you've transferred your project. However, some third-party effects and other third-party plug-ins may not continue to operate, even if you have versions of these plug-ins on the target system. In such cases, you may need to reapply some third-party effects.

Setup and installation

Installing the software

Before installing Adobe After Effects software, review the complete system requirements.

In addition to the full version of Adobe After Effects, you can also install additional copies on additional computers to use as After Effects render engines to assist with network rendering.

Installing a render-only instance of Adobe After Effects CC

Before you start:

If you have installed Creative Cloud applications on two computers, sign out of one of them by opening any of the applications and choosing Sign Out from the Help menu.

You can sign back into Creative Cloud on this computer after the render-only instances of After Effects are installed.

To install a render-only instance of After Effects CC, do the following:

1. Go to the product page to download and install After Effects CC.
2. When the installation is complete, start After Effects.
3. Choose Sign Out from the Help menu.
4. Quit After Effects.
5. Create and place the ae_render_only_node.txt file as described in this blog post.

Limitations of the trial version

The trial version of After Effects includes all of the codecs that are included with the full version of After Effects. This means that you can import and export to all of the supported file formats using the trial version.

The trial version of After Effects also includes the Keylight plug-in, mocha-AE, mocha shape, Cycore (CC) effects, and Color Finesse.

If your installation of After Effects is missing some third-party components, contact your system administrator to ensure that all licensed components have been installed correctly.

Activate the software

A single-user retail license activation supports two computers. For example, you can install the software on a desktop computer at work and on a laptop computer at home.

For more information on product licensing and activation, see the Read Me file or go to the Adobe website.

Workspaces, panels, and viewers

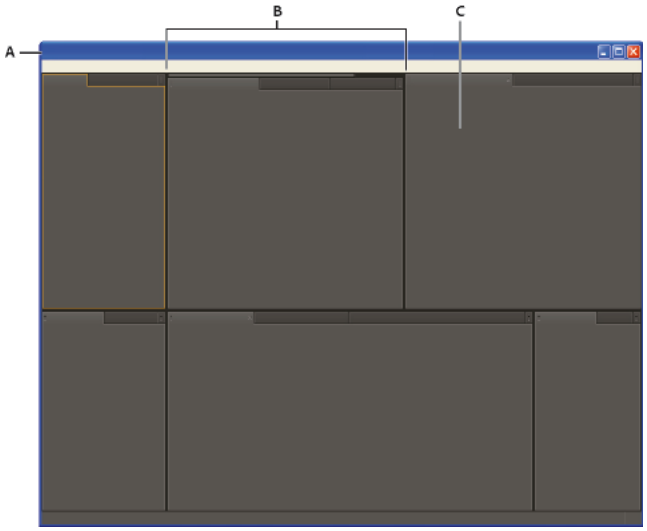
Workspaces and panels

Adobe video and audio applications provide a consistent, customizable user interface. Although each application has its own set of panels, you move and group panels in the same way in each application.

The main window of a program is the *application window*. Panels are organized in this window in an arrangement called a *workspace*.

Each application includes several predefined workspaces that optimize the layout of panels for specific tasks. You can also create and customize your own workspaces by arranging panels in the layout that best suits your working style for specific tasks.

You can drag panels to new locations, move panels into or out of a group, place panels alongside each other, and undock a panel so that it floats in a new window above the application window. As you rearrange panels, the other panels resize automatically to fit the window.



Example workspace
***A** Application window **B** Grouped panels **C** Individual panel*

To increase the available screen space, use multiple monitors. When you work with multiple monitors, the application window appears on the main monitor, and you place floating windows on the second monitor. Monitor configurations are stored in the workspace.

Workspaces are stored in XML files in the preferences folder. With some caveats regarding monitor size and layout, these workspaces can be moved to another computer and used there.

- (Windows) [drive]:\Users\[user_name]\AppData\Roaming\Adobe\After Effects\[version]\ModifiedWorkspaces
- (Mac OS) [drive]/Users/[user_name]/Library/Preferences/Adobe/After Effects/[version]/ModifiedWorkspaces

See this video tutorial about workspaces by Andrew Devis on the Creative Cow website for more details.

Stacked panel layout

Customize your workspace by grouping panels the way you want to. In a panel group, you can arrange panels in both stacked and tabbed states.

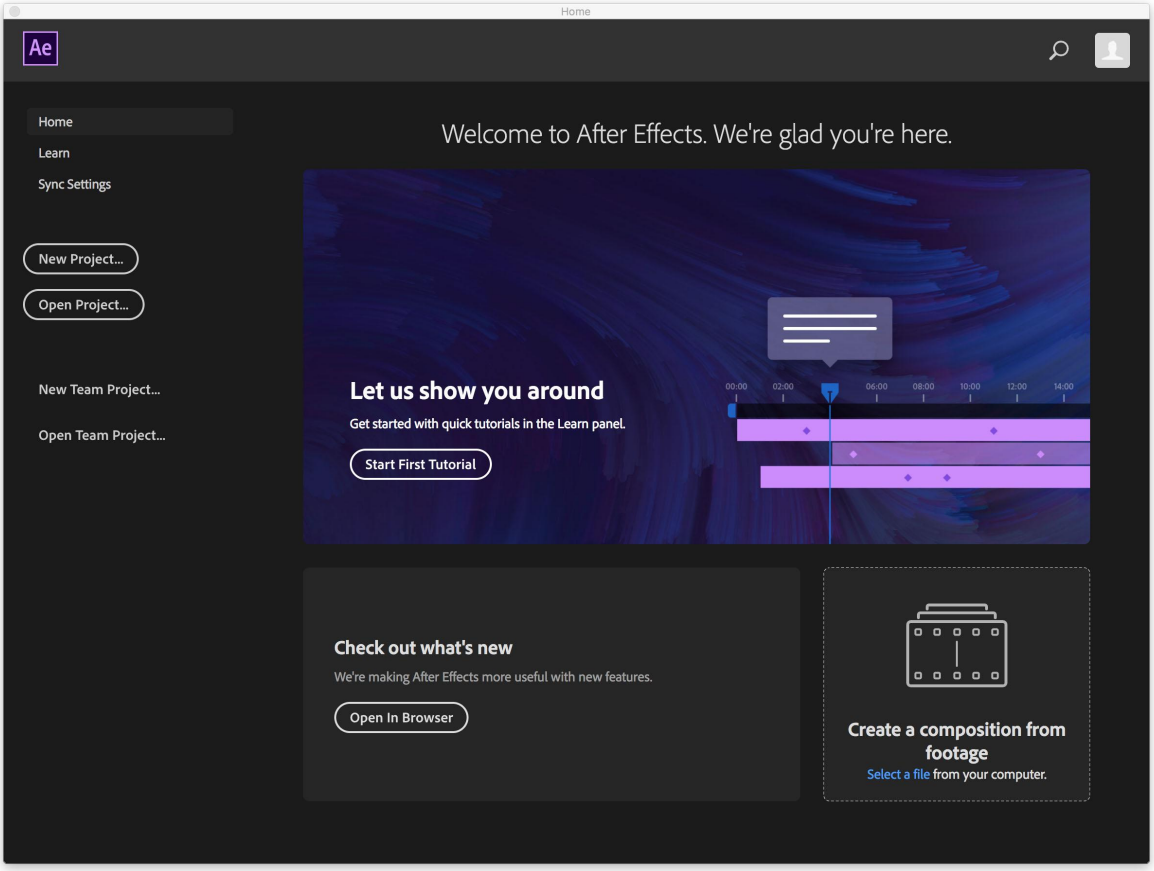
You can expand and collapse stacked panels with a single mouse-click on the panel header. For more information, see Working with stacked panels.

Navigate and use the Home screen

The Home screen assits you to get started quickly with After Effects. You can use the following options on the left hand side:

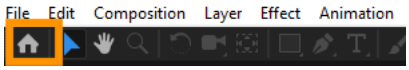
- Home: Click this tab to open the Home screen.
- New Project: Creates a project in After Effects.
- Open Project: Opens an exisitng project.
- New Team Project: Creates a Team Project.
- Open Team Project: Opens an exiting Team Project.

If you are a new user, the centre of the screen also gives you the option to create a project. As you create projects in After Effects, the content on the home screen evolves. Experienced users get an option to learn What's New in After Effects, along with other documentation links.



Home screen for new users

You can also use the Home icon at the left-hand side of the UI to navigate between the project and the Home screen.

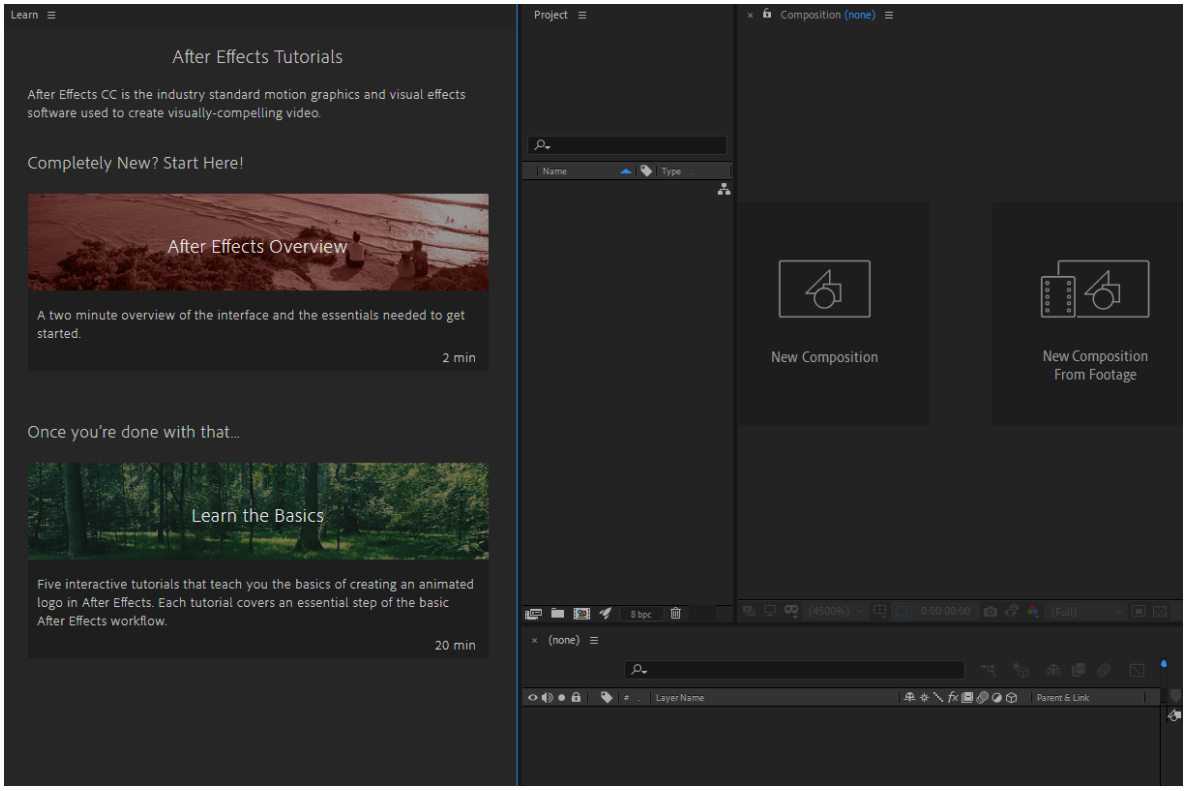


Use the Learn workspace and Learn panel

Learn panel

Designed for new-to-After Effects users, you can use tutorials in the **Learn** panel to quickly learn about the different panels, timeline, and effects in After Effects. You can access the learn panel from the **Window menu > Extensions**. You can use these lessons to create projects in the application.

The panel is fully interactive with task-oriented videos. When you click a video in the panel, it displays the steps to perform the task. As you try the steps in the UI, the panel tracks your motion and guides you through the steps. Once you complete a task, the status of the task updates to completed.


Learn
After Effects Tutorials
After Effects CC is the industry standard motion graphics and visual effects software used to create visually-compelling video.
Completely New? Start Here!
After Effects Overview
A two minute overview of the interface and the essentials needed to get started.
2 min
Once you're done with that...
Learn the Basics
Five interactive tutorials that teach you the basics of creating an animated logo in After Effects. Each tutorial covers an essential step of the basic After Effects workflow.
20 min
Project
Composition (none)
New Composition
New Composition From Footage

Learn panel and Learn workspace

Learn workspace

The **Learn** workspace offers a simple interface with the following panels that you use to create an After Effects project:

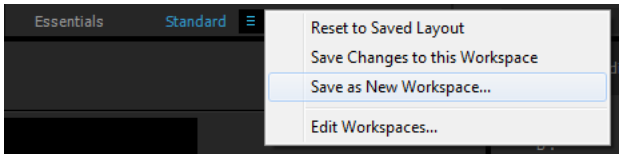
- Learn panel
- Project panel
- Composition panel
- Timeline panel

To access the workspace, select **Help > Learn After Effects**. The workspace includes the **Learn** panel docked to the side so that you can follow the instructions along with clear access to the rest of workspace.

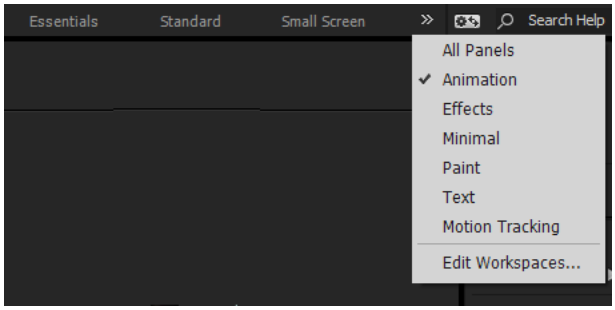
Customizing workspaces

Choose a workspace

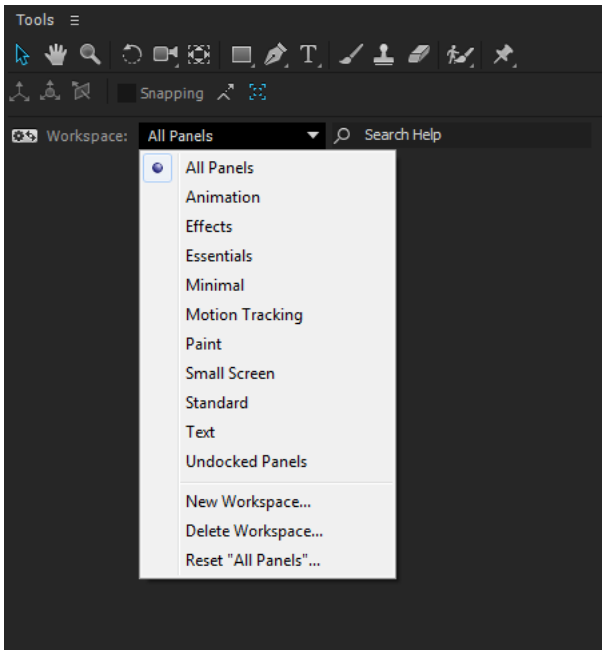
You can access custom or default workspaces with a single click in the new workspace bar. The workspace bar occupies the right side of the Tools panel. You can customize the width of the bar by dragging the vertical divider between the tool and the workspace bars.



The workspaces that do not fit in the available space display in the chevron menu (>>) on the workspace bar.

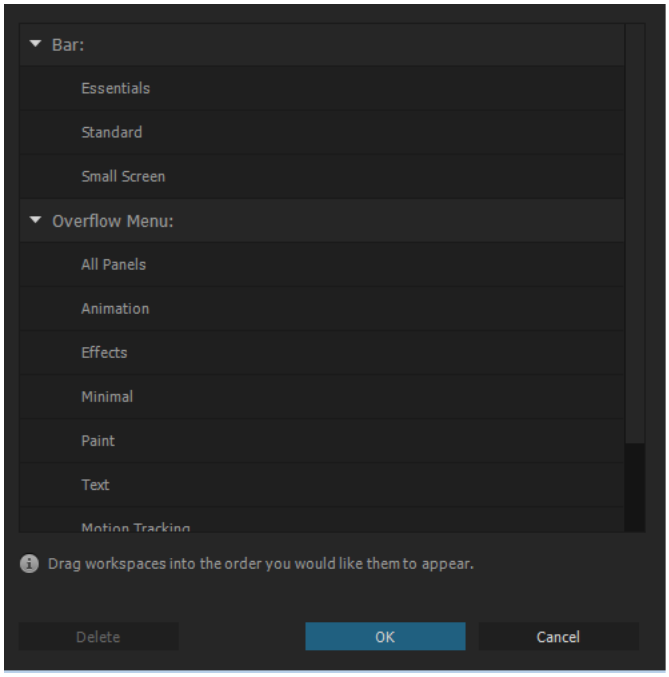


When you move the Tools panel from its position, the Workspace menu replaces the workspace bar.



Note:

*Choose **Window** > **Workspace** > **Edit Workspaces** or click the chevron menu (>>) on the workspace bar to display the **Edit Workspaces** dialog box. You can select a workspace and reorder workspaces.*



Edit Workspaces dialog box

Choose a workspace

- Choose Window > Workspace, and select the desired workspace.
- Choose a workspace from the Workspace menu in the Tools panel.
- If the workspace has a keyboard shortcut assigned, press Shift+F10, Shift+F11, or Shift+F12.

To assign a keyboard shortcut to the current workspace, choose Window > Assign Shortcut To [Workspace Name] Workspace.

Save, reset, or delete workspaces

Save a custom workspace

As you customize a workspace, the application tracks your changes, storing the most recent layout. To store a specific layout more permanently, save a custom workspace. Saved custom workspaces appear in the Workspace menu, where you can return to and reset them.

? Arrange the frames and panels as desired, and then choose Window > Workspace > New Workspace. Type a name for the workspace, and click OK.

Note:

(After Effects, Premiere Pro) If a project saved with a custom workspace is opened on another system, the application looks for a workspace with a matching name. If the application cannot find a match (or the monitor configuration doesn't match), it uses the current local workspace.

Reset a workspace

Reset the current workspace to return to its original, saved layout of panels.

? Choose Window > Workspace > Reset *workspace name*.

Delete a workspace

1 Choose Window > Workspace > **Delete Workspace**.

2 Choose the workspace you want to delete, and then click OK.

Note:

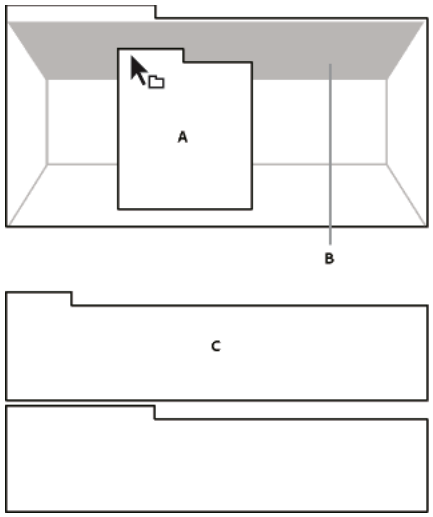
You cannot delete the currently active workspace.

Dock, group, or float panels

You can dock panels together, move them into or out of groups, and undock them so they float above the application window. As you drag a panel, *drop zones*—areas onto which you can move the panel—become highlighted. The drop zone you choose determines where the panel is inserted, and whether it docks or groups with other panels.

Docking zones

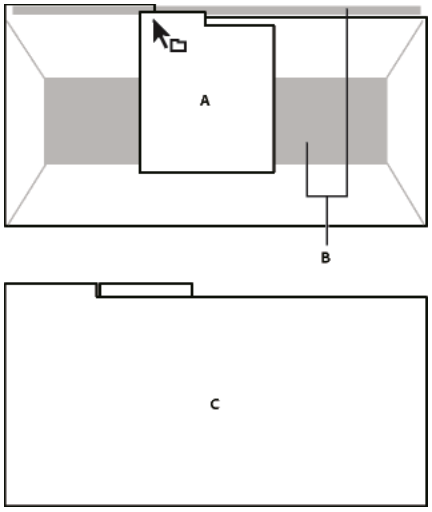
Docking zones exist along the edges of a panel, group, or window. Docking a panel places it adjacent to the existing group, resizing all groups to accommodate the new panel.



Dragging panel (A) onto docking zone (B) to dock it (C)

Grouping zones

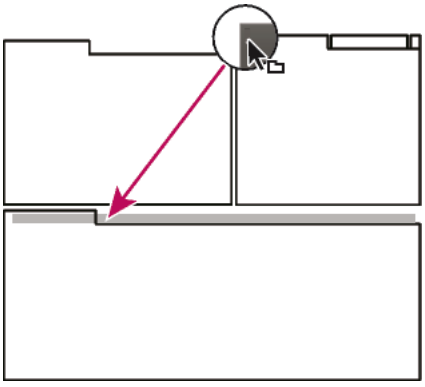
Grouping zones exist in the middle of a panel or group, and along the tab area of panels. Dropping a panel on a grouping zone stacks it with other panels.



Dragging panel (A) onto grouping zone (B) to group it with existing panels (C)

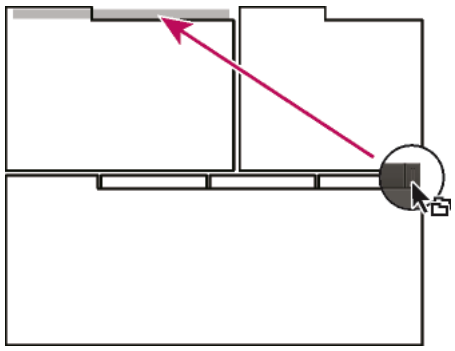
Dock or group panels

1. If the panel you want to dock or group is not visible, choose it from the Window menu.
2. Do one of the following:
   - To move an individual panel, drag the gripper area in the upper-left corner of a panel's tab onto the desired drop zone.



Drag panel gripper to move one panel

   - To move an entire group, drag the group gripper in the upper-right corner onto the desired drop zone.



Drag group gripper to move entire group

The application docks or groups the panel, according to the type of drop zone.

Undock a panel in a floating window

When you undock a panel in a floating window, you can add panels to the window and modify it similarly to the application window. You can use floating windows to use a secondary monitor, or to create workspaces like the workspaces in earlier versions of Adobe applications.

? Select the panel you want to undock (if it's not visible, choose it from the Window menu), and then do one of the following:

- Choose Undock Panel or Undock Frame from the panel menu. Undock Frame undocks the panel group.
- Hold down Ctrl (Windows®) or Command (Mac OS®), and drag the panel or group from its current location. When you release the mouse button, the panel or group appears in a new floating window.
- Drag the panel or group outside the application window. (If the application window is maximized, drag the panel to the Windows taskbar.)

Maximize or restore panel groups

Double-click the active panel's tab, or in the fallow area of the tab well of a panel group to maximize or restore that panel group. You can also press the ` (accent grave) key with the mouse pointer over that panel group to maximize or restore a panel group.

Resize panel groups

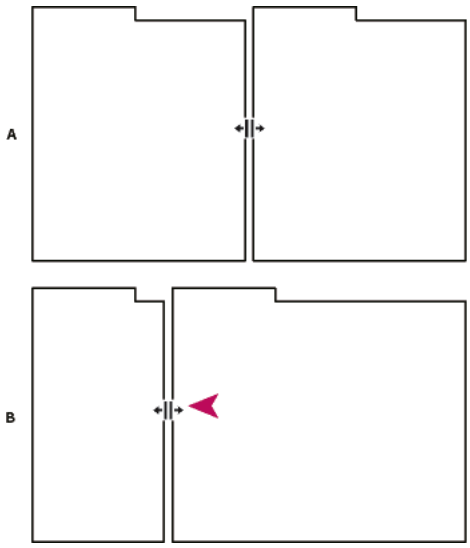
To quickly maximize a panel beneath the pointer, press the ` (accent grave) key. (The accent grave is the unshifted character under the tilde, ~, on standard US keyboards.) Press the key again to return the panel to its original size.

When you drag the divider between panel groups, all groups that share the divider are resized.

1 Do either of the following:

- To resize either horizontally or vertically, position the pointer between two panel groups. The pointer becomes a double arrow .
- To resize in both directions at once, position the pointer at the intersection between three or more panel groups. The pointer becomes a four-way arrow .

2 Hold down the mouse button, and drag to resize the panel groups.



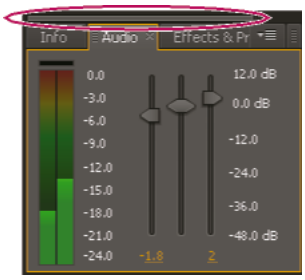
Dragging divider between panel groups to resize them horizontally
***A** Original group with resize pointer **B** Resized groups*

Open, close, and show panels and windows

Even if a panel is open, it may be out of sight, beneath other panels. Choosing a panel from the Window menu opens it and brings it to the front of its group.

When you close a panel group in the application window, the other groups resize to use the newly available space. When you close a floating window, the panels within it close, too.

- To open or close a panel, choose the panel from the Window menu.
- To close a panel or window, click its Close button . If you accidentally close a panel, choose the panel from the Window menu, and the panel will be displayed again.
- To open or close a panel, use its keyboard shortcut.
- If a frame contains multiple panels, place the pointer over a tab and roll the mouse scroll wheel forward or backward to change which panel is active.
- If a frame contains more grouped panels than can be shown at once, drag the scroll bar that appears above the tabs.



Scroll bar for showing tabs of other panels

Viewers

A *viewer* is a panel that can contain multiple compositions, layers, or footage items, or multiple views of one such item. The Composition, Layer, Footage, Flowchart, and Effect Controls panels are viewers.

Locking a viewer prevents the currently displayed item from being replaced when you open or select a new item. Instead, when a viewer is locked and a new item is opened or selected, After Effects creates a new viewer panel for that item. If you select the item from the viewer menu of a locked viewer, a new viewer isn't created; the existing viewer is used.

Instead of housing multiple items in a single viewer and using the viewer menu to switch between them, you can choose to open a separate viewer for each open composition, layer, or footage item. When you have multiple viewers open, you can arrange them by docking or grouping them, like any other panels.

For example, you can create one Composition viewer each for different 3D views (Top, Bottom, Back, Front, custom views) so that you can maximize each of the views with the ` (accent grave) keyboard shortcut, which maximizes or restores the panel under the pointer.

To create a custom workspace with multiple viewers, ensure that all viewers are unlocked before you save the workspace. Locked viewers are associated with a specific project context and are therefore not saved in the preferences file.

- To create a new viewer, choose New from the viewer menu. (See Open panel, viewer, and context menus.)
- To lock or unlock a viewer, choose Locked from the viewer menu, or click the Toggle Viewer Lock button.
- To lock the current viewer, split the current frame, and create a new viewer of the same type in the new frame, press Ctrl+Alt+Shift+N (Windows) or Command+Option+Shift+N (Mac OS).
- To cycle forward or backward through the items in the viewer menu list for the active viewer, press Shift+period (.) or Shift+comma (,).

Edit this, look at that (ETLAT) and locked Composition viewers

If a Composition viewer is locked, the Timeline panel for another composition is active, and the Composition viewer for the active composition is not shown, then most commands that affect views and previews operate on the composition for which the viewer is shown.

For example, pressing the *numpad 0* can start a preview for the composition visible in a locked Composition viewer rather than the composition associated with the active Timeline panel.

This behavior facilitates a working setup sometimes referred to as edit-this-look-at-that (ETLAT). The most common scenario in which this behavior is useful is the scenario in which you make a change in the Timeline panel for a nested (upstream) composition and want to preview the result of the change in a containing (downstream) composition.

Note:

ETLAT behavior works for keyboard shortcuts for zooming, fitting, previewing, taking and viewing snapshots, showing channels, showing and hiding grids and guides, and showing the current frame on a video preview device.

To prevent this behavior, unlock the Composition viewer or show the Composition viewer for the composition that you want to view or preview.

General user interface items

Activate a tool

The Tools panel can be displayed as a toolbar across the top of the application window or as a normal, dockable panel.

Note:

Controls related to some tools appear only when the tool is selected in the Tools panel.

- Click the button for the tool. If the button has a small triangle at its lower-right corner, hold down the mouse button to view the hidden tools. Then, click the tool you want to activate.
- Press the keyboard shortcut for the tool. (Placing the pointer over a tool button displays a tool tip with the name and keyboard shortcut for the tool.)
- To cycle through hidden tools within a tool category, repeatedly press the keyboard shortcut for the tool category. (For example, press the Q key repeatedly to cycle through the pen tools.)
- To momentarily activate a tool, hold down the key for the desired tool; release the key to return to the previously active tool. (This technique does not work with all tools.)
- To momentarily activate the Hand tool, hold down the spacebar, the H key, or the middle mouse button. (The middle mouse button does not activate the Hand tool under a few circumstances, including when the Unified Camera tool is active.)

To pan around in the Composition, Layer, or Footage panel, drag with the Hand tool. Hold Shift, too, to pan faster.

To show or hide panels most relevant to the active tool, click the panel button if available. For example, clicking this button when a paint tool is active opens or closes the Paint and Brushes panels. Select the Auto-Open Panels option in the Tools panel to automatically open the relevant panels when certain tools are activated.

Open panel, viewer, and context menus

Panel menus provide commands relative to the active panel or frame. Viewer menus provide lists of compositions, layers, or footage items that can be shown in the viewer, as well as commands for closing items and locking the viewer. Context menus provide commands relative to the item that is *context-clicked*. Many items in the After Effects user interface have associated context menus. Using context menus can make your work faster and easier.

- To open a panel menu, click the button in the upper-right corner of the panel.
- To open a viewer menu, click the name of the active composition, layer, or footage item in the viewer tab.
- To open a context menu, right-click (Windows) or Control-click (Mac OS). This action is sometimes referred to as context-clicking.

Columns

The Project, Timeline, and Render Queue panels contain columns.

- To show or hide columns, right-click (Windows) or Control-click (Mac OS) a column heading (or choose Columns from the panel menu), and select the columns that you want to show or hide. A check mark indicates that the column is shown.

Note:

In general, the search and filter functions in the Project and Timeline panels only operate on the content of columns that are shown.

- To reorder columns, select a column name and drag it to a new location.
- To resize columns, drag the bar next to a column name. Some columns cannot be resized.
- To sort footage items in the Project panel, click the column heading. Click once more to sort them in reverse order.

Search and filter in the Timeline, Project, and Effects & Presets panels

The Project, Timeline, and Effects & Presets panels each contain search fields that you can use to filter items in the panel.

- To place the insertion point in a search field, click in the search field.
- To place the insertion point in the search field for the active panel, choose File > Find or press Ctrl+F (Windows) or Command+F (Mac OS).
- To clear the search field, click the button that appears to the right of the text in the search field.

When you type in the search field, the list of items in the panel is filtered, showing some items and hiding others. Only items with entries that match the search query that you've typed are shown. The folders, layers, categories, or property groups that contain the matched items are also shown, to provide context.

In general, only text in columns that are shown is searched for this filtering operation. For example, you may need to show the Comments column to search and filter by the contents of comments. (See Columns.)

If one or more layers are selected in a composition, the filtering operation in the Timeline panel only affects selected layers. In this case, unselected layers are not filtered out (hidden) if they don't match the search query. However, if no layers are selected in the composition, the filtering operation applies to all layers in the composition. This behavior matches that for showing and hiding of layer properties by pressing their property shortcut keys. (See Show or hide properties in the Timeline panel.)

Clearing the search field and ending the search causes expanded folders and property groups to collapse (close). Therefore, it's easier to work with the items that are found by the filter operation if you operate on them before you clear the search field and end the search.

If the text that you type in the search field in the Project or Timeline panel contains spaces, the spaces are treated as and-based operators. For example, typing *dark solid* matches footage items or layers named Dark Red Solid and Dark Gray Solid. In the Effects & Presets panel, spaces are treated as space characters in the search field. For example, typing *change color* matches the Change Color effect, but not the Change To Color effect.

Project, Timeline, and Effects & Presets panels accept or-based searching. In an or-based search, a comma denotes an or, with and-based operators taking precedence over or-based ones. For example, sometimes the name of the property that determines the amount for a blur effect is *Amount*, sometimes it is *Blurriness*, and sometimes it is *Blur Radius*. If you search for Amount, Blurriness, Radius, then you will see the equivalent values for all of your blur effects.

When you type in a search field, recent search strings that match your input appear.

This search method also allows a way to save items you use often via a menu that opens when you click the search icon in the search field. The search menu consists of two lists, separated by a divider. The top list contains the six most recent searches, with the most recent one at the top. The bottom list contains saved search items. As you type, the top list filters to show matching terms.

- To save a search item, Shift-click it in the top list of the search menu. Up to ten items may be saved.
- To delete a saved search item from either list, hover the mouse over the item to highlight it, and then press Delete or Backspace.

Examples of searches in the Project panel

- To show only footage items for which the name or comment contains a specific string, start typing the string.
- To show only footage items for which the source file is missing, type the entire word *missing*. (This search works whether or not the File Path column is shown, which is an exception to the general rule that only shown columns are searched.)
- To show only unused footage items, type the entire word *unused*.
- To show only used footage items, type the entire word *used*.
- To show only Cineon footage items, type *Cineon* with the Type column shown.

Examples of searches in the Timeline panel

- To show only layers and properties for which the name or comment contains a specific string, type the string. For example, type *starch* to show pins created by the Puppet Starch tool.
- To show only properties that have an expression that uses a specific method, type the method name.
- To show only layers with a specific label, type the label name. (See Color labels for layers, compositions, and footage items.)

Click the swatch for a label to see the context menu that lists the label names. Alternatively, drag the right edge of the Label column heading to expand the column to read the label names.

Scroll or zoom with the mouse wheel

You can use the mouse wheel to zoom in the Timeline, Composition, Layer, and Footage panels. You can use the mouse wheel to scroll in the Timeline, Project, Render Queue, Flowchart, Effect Controls, Metadata, and Effects & Presets panels.

- To zoom into the center of the panel, or into the feature region when tracking, roll the mouse wheel forward.
- To zoom out of the center of the panel, or out of the feature region when tracking, roll the mouse wheel backward.
- To zoom into the area under the pointer, hold down Alt (Windows) or Option (Mac OS) as you roll the mouse wheel forward. In the Timeline, Footage, and Layer panels, this action zooms in time when the pointer is over the time navigator or time ruler.
- To zoom out of the area under the pointer, hold down Alt (Windows) or Option (Mac OS) as you roll the mouse wheel backward. In the Timeline, Footage, and Layer panels, this action zooms in time when the pointer is over the time navigator or time ruler.
- To scroll vertically, roll the mouse wheel forward or backward.

- To scroll horizontally, hold down Shift as you roll the mouse wheel backward or forward. In the Timeline, Footage, and Layer panels, Shift-rolling backward moves forward in time and vice versa when the pointer is over the time navigator or time ruler.

You can scroll or zoom with the mouse wheel in a panel even if it is not currently active, as long as the pointer is over it.

Undo changes

You can undo only those actions that alter the project data. For example, you can undo a change to a property value, but you cannot undo the scrolling of a panel or the activation of a tool.

You can sequentially undo as many as 99 of the most recent changes made to the project.

To avoid wasting time undoing accidental modifications, lock a layer when you want to see it but do not want to modify it.

- To undo the most recent change, choose Edit > Undo [action] or *Ctrl-Z*
- To undo a change and all changes after it, choose Edit > History, and select the first change that you want to undo.
- To revert to the last saved version of the project, choose File > Revert. All changes made and footage items imported since you last saved are lost. You cannot undo this action.

After Effects user interface tips

- Use ClearType text anti-aliasing on Windows. ClearType makes the outlines of system text, such as menus and dialog boxes, easier to read. See Windows Help for information on how to enable ClearType text anti-aliasing.
- To show tool tips, select the Show Tool Tips preference (Edit > General > Preferences (Windows) or After Effects > Preferences > General (Mac OS)).
- Use a workspace that contains the Info panel, and leave that panel in front of other panels in its panel group whenever possible. The Info panel shows messages about what After Effects is doing, information about items under the pointer, and much more.
- Use context menus.
- Use keyboard shortcuts.

Working with After Effects and other applications

Working with Adobe Bridge and After Effects

Use Adobe Bridge to run animation presets; run cross-product workflow automation scripts; view and manage files and folders; organize your files by assigning keywords, labels, and ratings to them; search for files and folders; and view, edit, and add metadata.

- To open Adobe Bridge from After Effects, choose File > Browse In Bridge.
- To reveal a file in Adobe Bridge, select a file in the Project panel and choose File > Reveal In Bridge.

- To use Adobe Bridge to browse for animation presets, choose Animation > Browse Presets.

Adobe Bridge is part of the Creative Cloud suite of applications and can be downloaded and installed through Creative Cloud. See the help documentation and the Adobe Bridge CC product page for more information.

See this video to get an overview of Adobe Bridge CC.

Working with Photoshop and After Effects

If you use Photoshop to create still images, you can use After Effects to bring those still images together and make them move and change. In After Effects, you can animate an entire Photoshop image or any of its layers. You can even animate individual properties of Photoshop images, such as the properties of a layer style. If you use After Effects to create movies, you can use Photoshop to refine the individual frames of those movies.

Comparative advantages for specific tasks

The strengths of After Effects are in its animation and automation features. This means that After Effects excels at tasks that can be automated from one frame to another. For example, you can use the motion tracking features of After Effects to track the motion of a microphone boom, and then automatically apply that same motion to a stroke made with the Clone Stamp tool. In this manner, you can remove the microphone from every frame of a shot, without having to paint the microphone out by hand on each frame.

In contrast, Photoshop has excellent tools for painting and drawing.

Deciding which application to use for painting depends on the task. Paint strokes in Photoshop directly affect the pixels of the layer. Paint strokes in After Effects are elements of an effect, each of which can be turned on or off or modified at any time. If you want to have complete control of each paint stroke after you've applied it, or if you want to animate the paint strokes themselves, use the After Effects paint tools. If the purpose of applying a paint stroke is to permanently modify a still image, use the Photoshop paint tools. If you are applying several paint strokes by hand to get rid of dust, consider using the Photoshop paint tools.

The animation and video features in Photoshop include simple keyframe-based animation. After Effects uses a similar interface, though the breadth and flexibility of its animation features are far greater.

After Effects can also automatically create 3D layers to mimic the planes created by the Photoshop Vanishing Point feature.

Exchanging still images

After Effects can import and export still images in many formats, but you will usually want to use the native Photoshop PSD format when transferring individual frames or still image sequences between After Effects and Photoshop.

When importing or exporting a PSD file, After Effects can preserve individual layers, masks, layer styles, and most other attributes. When you import a PSD file into After Effects, you can choose whether to import it as a flattened image or as a composition with its layers separate and intact.

It is often a good idea to prepare a still image in Photoshop before importing it into After Effects. Examples of such preparation include correcting color, scaling, and cropping. It is often better for you to do something once to the source image in Photoshop than to have After Effects perform the same operation many times per second as it renders each frame for previews or final output.

By creating your new PSD document from the Photoshop **New File** dialog box with a **Film & Video** preset, you can start with a document that is set up correctly for a specific video output type. If you are already working in After Effects, you can create a new PSD document that matches your composition and project settings by choosing **File > New > Adobe Photoshop File**.

Exchanging movies

You can also exchange video files, such as QuickTime movies, between Photoshop and After Effects. When you open a movie in Photoshop, a video layer is created that refers to the source footage file. Video layers allow you to paint nondestructively on the movie's frames, much as After Effects works with layers with movies as their sources. When you save a PSD file with a video layer, you save the edits that you made to the video layer, not edits to the source footage itself.

You can also render a movie directly from Photoshop. For example, you can create a QuickTime movie from Photoshop that can then be imported into After Effects.

Color

After Effects works internally with colors in an RGB (red, green, blue) color space. Though After Effects can convert CMYK images to RGB, you should do video and animation work in Photoshop in RGB.

If relevant for your final output, it is better to ensure that the colors in your image are broadcast-safe in Photoshop before you import the image into After Effects. A good way to do this is to assign the appropriate destination color space—for example, SDTV (Rec. 601)—to the document in Photoshop. After Effects performs color management according to color profiles embedded in documents, including imported PSD files.

Working with Animate CC and After Effects

If you use Adobe Animate (formerly called Flash Professional) to create video or animation, you can use **After Effects** to edit and refine the video. For example, from Adobe Animate, you can export animations and applications as QuickTime movies, .mp4, and other standard video formats. You can then use **After Effects** to edit and refine the video.

If you use After Effects to edit and composite video, you can then use Animate to publish that video.

Animate and After Effects use separate terms for some concepts that they share in common. The following table lists the differences between the terms used in the two applications:

After Effects	**Animate**
Composition	Movie Clip
Composition frame (Composition panel)	Stage
Project panel	Library panel
Project files	FLA files
Render and export a movie	Publish SWF file

Additional resources

The following articles provide additional information about using Animate and **After Effects** together:

- Richard Harrington and Marcus Geduld provide an excerpt, "Flash Essentials for **After Effects** Users", of their book **After Effects** for Flash | Flash for **After Effects** on the Peachpit website. In this chapter, Richard and Marcus explain Animate in terms that an After Effects user can understand. http://www.peachpit.com/articles/article.aspx?p=1350895
- Richard Harrington and Marcus Geduld also provide "After Effects Essentials for Flash Users", another excerpt from their book **After Effects** for Flash | Flash for **After Effects**. In this chapter, Richard and Marcus explain After Effects in terms that an Animate user can understand. http://www.peachpit.com/articles/article.aspx?p=1350894
- Robert Powers provides a video tutorial on the Slippery Rock NYC website that shows the basics of using **After Effects** from the perspective of someone who is familiar with **Animate**.

Exporting QuickTime video from Animate

If you create animations or applications with Animate, you can export them as QuickTime movies using the File > Export > Export Movie command in Animate. For a Animate animation, you can optimize the video output for animation. For an Animate application, Animate renders video of the application as it runs, allowing the user to manipulate it. This lets you capture the branches or states of your application that you want to include in the video file.

Importing and publishing video in Animate

When you import a movie file into Animate, you can use various techniques, such as scripting or Animate components, to control the visual interface that surrounds your video. For example, you might include playback controls or other graphics. You can also add graphic layers on top of the movie for composite results.

Composite graphics, animation, and video

Animate and After Effects each include many capabilities that allow you to perform complex compositing of video and graphics. Which application you choose to use will depend on your personal preferences and the type of final output you want to create.

Animate is the more web-oriented of the two applications, with its small final file size. Animate also allows for run-time control of animation. After Effects is oriented toward video and film production, provides a wide range of visual effects, and is generally used to create video files as final output.

Both applications can be used to create original graphics and animation. Both use a timeline and offer scripting capabilities for controlling animation programmatically. After Effects includes a larger set of effects.

Both applications allow you to place graphics on separate layers for compositing. These layers can be turned on and off as needed. Both also allow you to apply effects to the contents of individual layers.

In Animate, composites do not affect the video content directly; they affect only the appearance of the video during playback in Flash Player. In contrast, when you composite with imported video in After Effects, the video file you export actually incorporates the composited graphics and effects.

Because all drawing and painting in After Effects is done on layers separate from any imported video, it is always non-destructive. Animate has both destructive and nondestructive drawing modes.

Importing SWF files into After Effects

Animate has a unique set of vector art tools that make it useful for a variety of drawing tasks not possible in After Effects or Adobe® Illustrator®. You can import SWF files into After Effects to composite them with other video or render them as video with additional creative effects. Interactive content and scripted animation are not retained. Animation defined by keyframes is retained.

Each SWF file imported into After Effects is flattened into a single continuously rasterized layer, with its alpha channel preserved. Continuous rasterization means that graphics stay sharp as they are scaled up. This import method allows you to use the root layer or object of your SWF files as a smoothly rendered element in After Effects, allowing the best capabilities of each tool to work together.

Importing FLA files into After Effects

You can import Animate FLA files into After Effects as a composition of layered .swf files. You can composite them with a video or render them as video with additional creative effects.

To use the functionality, ensure that you install Animate 19.0 on the same computer.

When you import an Animate document into After Effects, the individual layers are exported by Animate as .swf files, and those files are added to the composition. During import, choose a location for the imported files in the **Import Preferences** dialog.

If the Import Audio option is enabled, audio layers are exported by Animate as .wav files.

Note:

Only ActionScript 3.0 documents are supported. To convert an HTML5 Canvas or WebGL document to ActionScript 3.0, open the document in Animate and select ***File > Convert To > ActionScript 3.0****.*

Working with Adobe XD and After Effects

You can export layers and artboards from Adobe XD to your After Effects project. This functionality enhances assets transfer between XD and After Effects, with native mapping of layers, artboards, vectors, text and artwork. As an Adobe XD designer, you can send to After Effects groups of layers and define advanced micro-interactions or artboards to create complex and refined transitions and interactions. If After Effects is not installed on your machine, the **After Effects** option from XD menu is greyed out.

To export your design assets from XD to After Effects:

1. In XD, select the layer or artboard you want to animate in After Effects.
2. Select **File** > **Export** > **After Effects**. After Effects launch (if closed) or moves to foreground (if opened in background).
3. In a new composition the layers and artboards are added to your After Effects project as native shapes, texts, assets and nested compositions.

Note:

Export to After Effects is supported only with After Effects CC 2018 and 2019 versions. If you have an older version installed, Export to After Effects option is disabled in XD. To enable this option, log into your Creative Cloud application and update After Effects to the latest version.

List of supported XD features

After Effects supports the following XD features:

- Vector shapes
- Paths
- Text layers
- Bitmaps
- Masks
- Groups
- Artboards
- Symbols
- Boolean operations
- Strokes
- Fills
- Shadows
- Opacity

- Object blur
- Background blur and brightness
- Gradients as images
- Repeat grids

Working with Adobe Premiere Pro and After Effects

Adobe Premiere Pro is designed to capture, import, and edit movies. After Effects is designed to create motion graphics, apply visual effects, composite visual elements, perform color correction, and perform other post-production tasks for movies.

You can easily exchange projects, compositions, sequences, tracks, and layers between After Effects and Adobe Premiere Pro:

- You can create text template compositions in After Effects where you can edit the source text in Premiere Pro. See Live Text Templates.
- You can import an Adobe Premiere Pro project into After Effects. See Import an Adobe Premiere Pro project.
- You can export an After Effects project as an Adobe Premiere Pro project. See Export an After Effects project as an Adobe Premiere Pro project.
- You can copy and paste layers and tracks between After Effects and Adobe Premiere Pro. See Copy between After Effects and Adobe Premiere Pro.
- You can render and replace After Effects compositions in Premiere Pro to speed up compositions that take a long time to render. (See Render and Replace After Effects compositions in Adobe Premiere Pro.)

If you have Adobe Premiere Pro, you can do the following:

- Use Adobe Dynamic Link to work with After Effects compositions in Adobe Premiere Pro. A dynamically linked composition appears as a clip in Adobe Premiere Pro.
- Use Adobe Dynamic Link to work with Adobe Premiere Pro sequences in After Effects. A dynamically linked sequence appears as a footage item in After Effects.
- Start After Effects from within Premiere Pro and create a new composition with settings that match the settings of your Premiere Pro project.
- Select a set of clips in Adobe Premiere Pro and convert them to a composition in After Effects.

For information on using Dynamic Link with After Effects and Premiere Pro, see Dynamic Link and After Effects and Dynamic Link sections in Adobe Premiere Pro Help.

Working with Adobe Media Encoder and After Effects

You can use Adobe Media Encoder to export video from After Effects. Use Adobe Media Encoder to encode formats like H.264, MPEG-2, and WMV. Other formats, are available in Adobe Media Encoder, but not in After Effects. For example, the DNxHD format is available in Adobe Media Encoder, but not in After Effects.

You can add After Effects project files to a watch folder in Adobe Media encoder, and the composition is automatically added to the encoding queue Adobe Media Encoder. See the Import files with Watch folder section in Adobe Media Encoder for detailed information.

For details about using Adobe Media Encoder with After Effects, see Render and export with Adobe Media Encoder.

See this tutorialto learn how to export After Effects compositions using Adobe Media Encoder.

Edit in Adobe Audition

While working in After Effects, you can use the more comprehensive audio-editing capabilities of Adobe Audition to fine-tune your audio. You can use the Edit in Adobe Audition command to start Adobe Audition from within After Effects.

If you edit an audio-only file (for example, a WAV file) in Adobe Audition, you change the original file. If you edit a layer that contains both audio and video (for example, an AVI file), you edit a copy of the source audio file.

1. Select the layer that contains the audio that you want to edit. The item must be of a type that is editable in Adobe Audition.
2. Choose **Edit > Edit In Adobe Audition** to open the clip in **Edit** view in Adobe Audition.
3. Edit the file, and then do one of the following:
   - If you're editing an audio-only layer, choose **File > Save** to apply your edits to the original audio file. You can also choose **File > Save As** to apply your edits to a copy of the audio file. If you choose **File > Save As**, import the copy of the file into After Effects.
   - If you're editing a layer that contains both audio and video, choose **File > Save As**. After you save the file, import it into After Effects. Then, add it to the composition, and mute the original audio in the audio-video clip by deselecting the **Audio** switch in the **Timeline** panel.

   Note:

   Any effects applied to audio in After Effects aren't included in the copy that is sent to Adobe Audition.

Tutorials and resources about using Adobe Audition to modify audio from After Effects can be found on this post from the After Effects Region of Interest blog.

Sync Settings in After Effects

Note:

Effective with the December 10 2018 release (After Effects 16.0.1), the Sync Settings architecture has been updated. This means some changes to the workflow for After Effects, Premiere Pro, and Media Encoder:

- The option to clear Sync Settings through Creative Cloud is no longer available (previously accessed through **Manage Creative Cloud Account**)
- Sync Settings are available in current and recent versions of After Effects:
  - Select **Sync Settings** from the Start screen on macOS and Windows.
  - Within the application on Windows you can also select **File > Sync Settings**. On macOS select the After Effects menu and then either **Sync Settings** (if there are currently no synced settings) or your Creative Cloud account email (if you have existing synced settings)
- Sync Settings are no longer available in After Effects CC 2015.3 (13.8.1) or older. To use Sync Settings, update to a more recent version.

When you work on multiple computers, managing and syncing preferences among the computers can be time-consuming, complex, and error-prone.

The **Sync Settings** feature in After Effects enables you to sync preferences and settings via Creative Cloud. For example, if you use two computers, the **Sync Settings** feature makes it easy for you to keep those settings synchronized across these two computers.

The synchronization takes place via your Adobe Creative Cloud account. Settings are uploaded to your Creative Cloud account and then are downloaded and applied on the other computer. You can also synchronize settings from another Creative Cloud account. After Effects creates a user profile on your computer and uses it to synchronize settings to and from the associated Creative Cloud account.

You can initiate the synchronization manually; it does not happen automatically and it cannot be scheduled.

Synchronize your settings

To initiate the synchronization, choose **Edit** > [your Adobe ID] > **Sync Settings Now** (Windows) or **After Effects** > [your Adobe ID] > **Sync Settings Now** (macOS)**.**

You can also synchronize the settings on the Start screen. Click **SYNC SETTINGS** > **Sync Now** [your Adobe ID] on the screen to initiate the synchronization.

- **Download Settings**: Synchronize Settings from Creative Cloud to your computer; overwrite the local version with the Creative Cloud version of settings.
- **Upload Settings**: Synchronize settings from this local computer to Creative Cloud.

Progress and details about the synchronization is displayed in the Info panel (**Window**>**Info**).

*Restart After Effects to apply downloaded preferences after using **Sync Settings** .*

Managing synchronization

Clear Settings

Select **Edit** > [your Adobe ID] > **Clear Settings** (Windows) or **After Effects** [your Adobe ID] > **Clear Settings** (Mac OS), to clear all settings and reset them to the default state. **Clear Settings** also resets the token that is used to indicate the user's settings that was used to sync the settings.

Click **Quit** to clear the current preferences, and close After Effects. When the application is launched again, default preferences are set.

Manage Sync Settings

To change the settings for the Sync Settings feature (Windows):

- Click **Edit** > [your Adobe ID] > **Manage Sync Settings**
- Click **Edit** > **Preferences** > **Sync Settings**

To change the settings for the Sync Settings feature (Mac OS):

- Click **After Effects** > [your Adobe ID] > **Manage Sync Settings**
- Click **After Effects** > **Preferences** > **Sync Settings**

You can change the following settings in the settings dialog:

Automatically clear user profile on application quit Enable this option to clear the user profile when you quit After Effects. On next launch, preferences are fetched from the default Adobe ID used to license the product.

Select the preferences to synchronize.

1. **Synchronizable Preferences**
2. **Keyboard Shortcuts**
3. **Composition Settings Presets**
4. **Interpretation Rules**
5. **Render Settings Templates**
6. **Output Module Settings Templates**

Note:

Synchronizable preferences refer to preferences that are not dependent on computer or hardware settings.

Note:

Keyboard shortcuts created for Windows synchronize only with Windows and Mac OS keyboard shortcuts synchronize only with Mac OS.

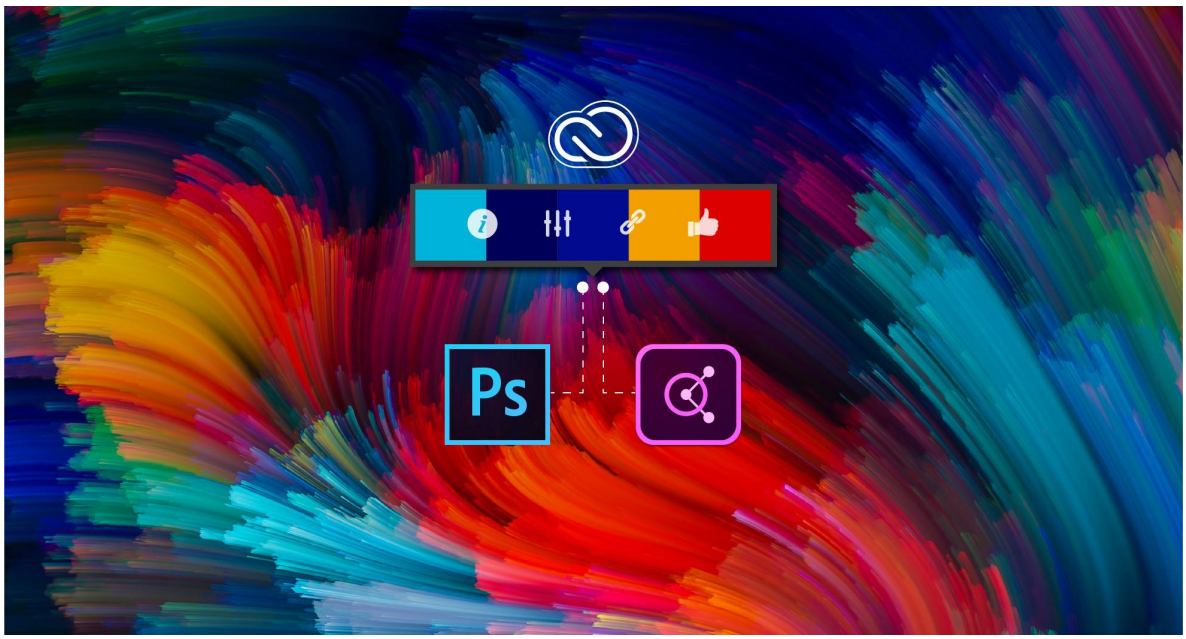
Choose one of the following options from the drop-down menu to instruct After Effects when to synchronize the settings :

- **Ask my preference**
- **Always Upload Settings**
- **Always Download Settings**

Note:

The Sync Settings feature does not synchronize files that are manually placed in the preferences folder location.

Use the Adobe Color Themes extension



The Adobe Color service helps you choose harmonious and appealing color combinations for your After Effects compositions. Adobe Color is integrated right within After Effects in the form of an extension that lets you create, save, and access your color themes. You can also explore the many public color themes available on Adobe Color and filter them in several ways: **Most Popular**, **Most Used**, **Random**, themes you've published, or themes you've appreciated in the past. Once you've found a theme that you like; you can edit it and save it to your themes, or add it to your swatches in After Effects.

Aside from After Effects, the **Adobe Color Themes** extension is currently available in two other Creative Cloud desktop applications: Adobe InDesign and Adobe Photoshop. Themes saved to Creative Cloud libraries from within these desktop apps, mobile apps such as Capture CC, or using the Adobe Color website are accessible seamlessly in After Effects.

Access the Adobe Color Themes panel

- In After Effects, select **Window** > **Extensions** > **Adobe Color Themes**.

Explore color themes

Explore themes

1 Click the **Explore** tab in the **Adobe Color Themes** panel. By default, the **Explore** tab displays all public color themes.

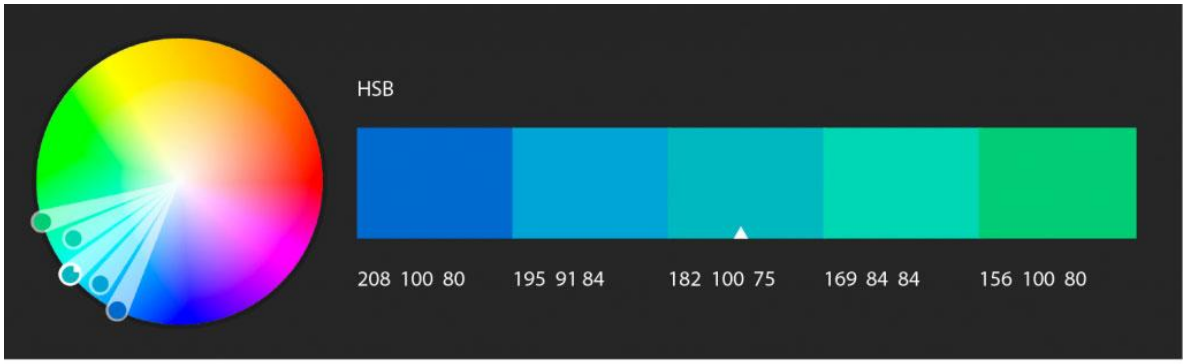
2 If necessary, filter the color themes by a category and a timeframe. Use the search bar if you're looking for a specific theme.

Create and save a color theme

1 Click the Create tab in the Adobe Color Themes panel.

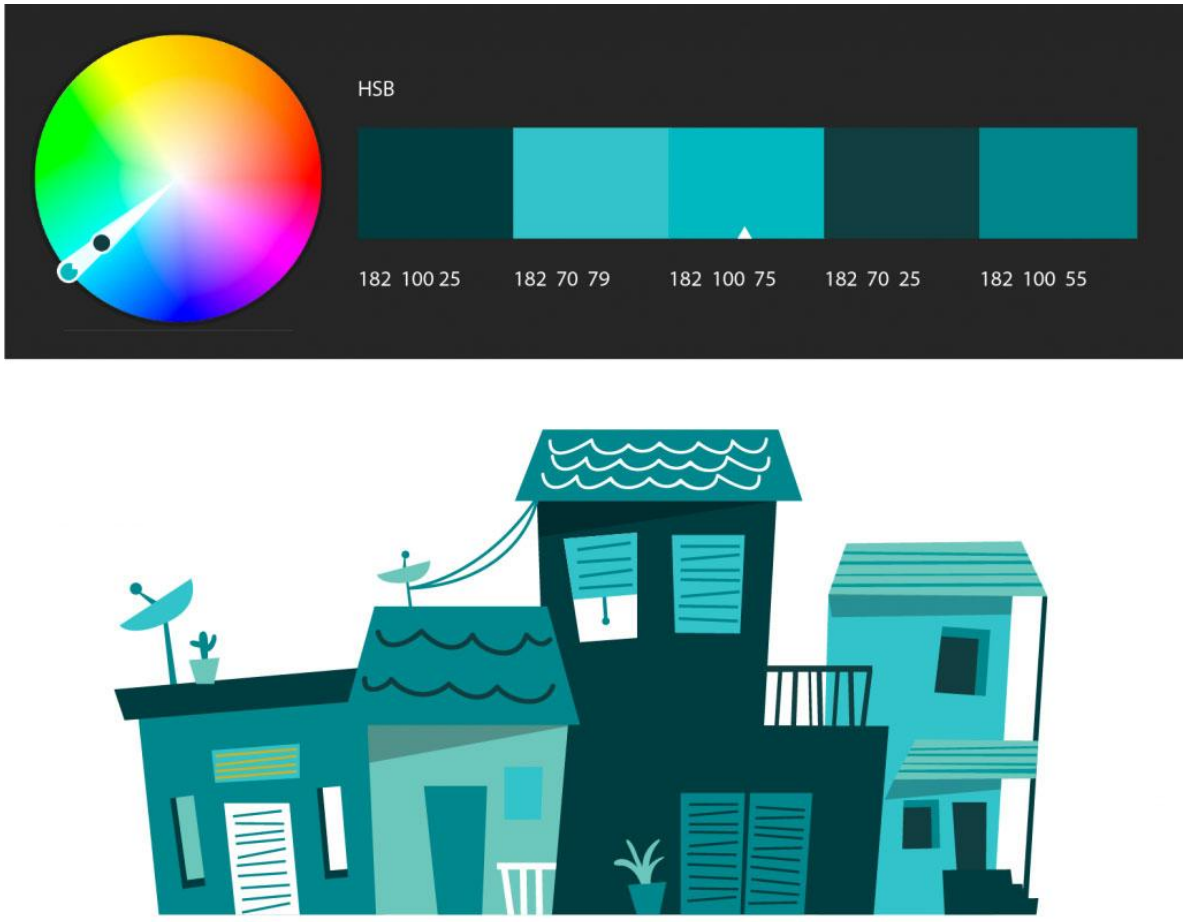
2 Select the color rule on which you want to base the theme: **Analogous**, **Monochromatic**, **Triad**, **Complementary**, **Compound**, **Shades**, or **Custom**.

Analogous Uses colors that are adjacent on the color wheel. Analogous colors usually blend well with one another and are harmonious and pleasing to the eye.



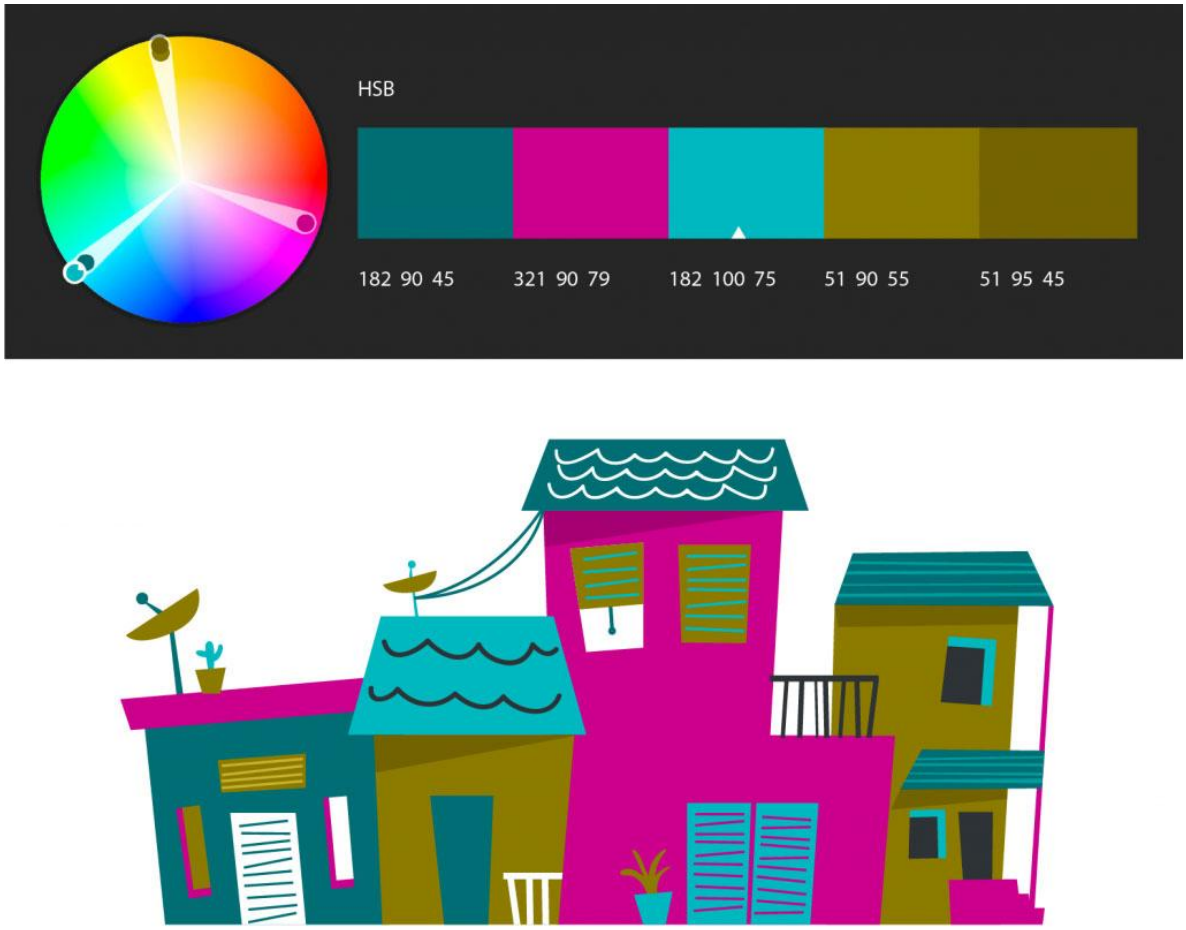
Example: Analogous color rule

Monochromatic Uses variations in saturation and brightness of a single color. When you use this color rule, you're presented with five colors sharing the same hue (example: *H:182*) but different saturation and brightness values. Monochromatic colors go well together and produce a soothing effect.



Example: Monochromatic color rule

Triad Uses colors evenly spaced around three equidistant points on the color wheel. When you use this color rule, you're presented with two colors with the same hue but different saturation and brightness values from the first point on the color wheel (example: *HSB: 182, 90, 45 & HSB: 182, 100, 75*), two from the second point on the color wheel (*HSB: 51, 90, 55 & HSB: 51, 95, 45*), and one color from the third point (*HSB: 321, 90, 79*). Triadic colors tend to be contrasting—albeit not as contrasting as complementary colors—while still retaining harmony when used together.



Example: Triad color rule

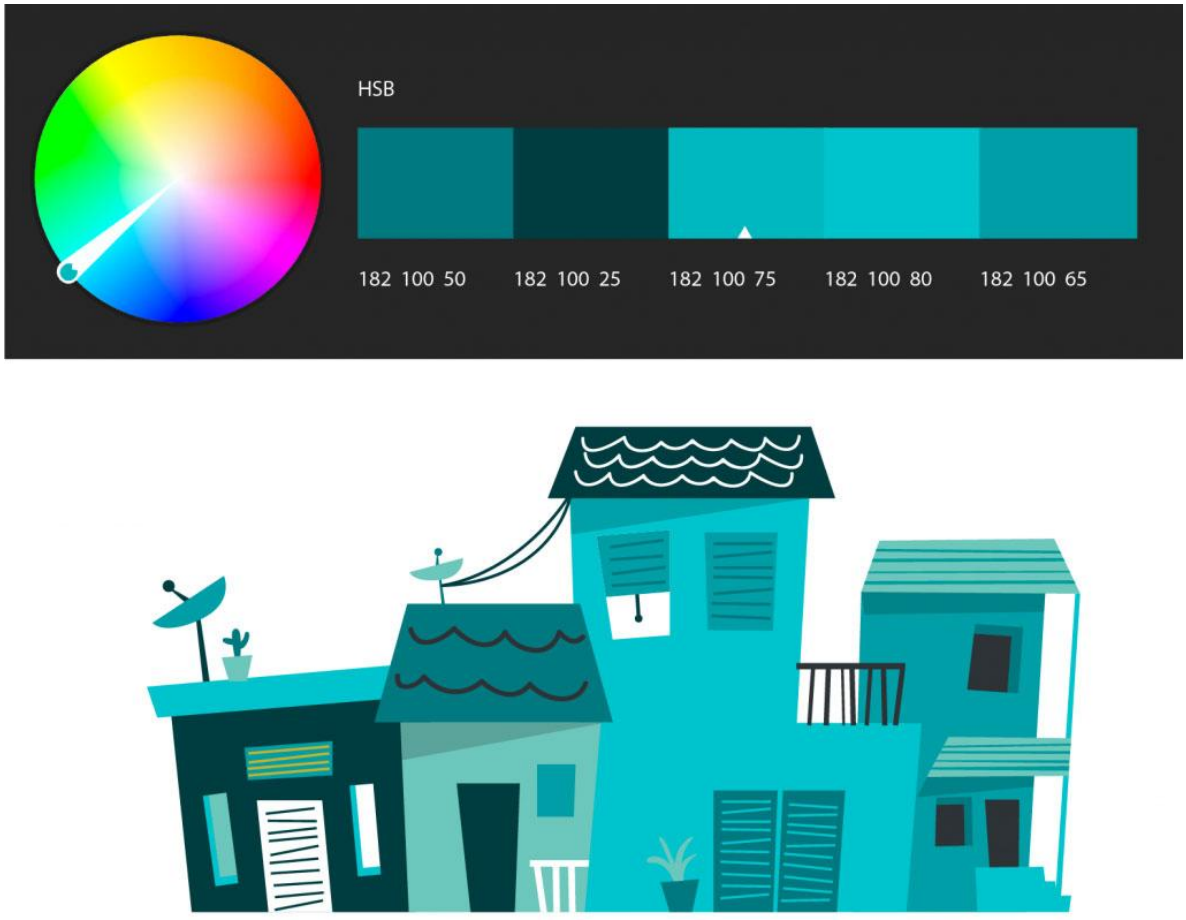
Complementary Uses colors opposite to each other on the color wheel. When you use this color rule, you are presented with two colors with the same hue as the base color (example: *HSB: 182, 100, 45 & HSB: 182, 90, 100*), the base color itself (*HSB: 182, 100, 75*), and two colors with the same hue from the opposite point on the color wheel (*HSB: 23, 100, 45 & HSB: 23, 100, 75*). Complementary colors provide high contrast and tend to stand out when used together.

Example: Complementary color rule

Compound Uses a mix of complementary and analogous colors. When you use this color rule, you are presented with two colors with the same hue that are adjacent (analogous) to the base color (example: *HSB: 214, 90, 95 & HSB: 214, 60, 35*), the base color itself (*HSB: 182, 100, 75*), and two colors opposite to the base color (complementary) but adjacent to each other (*HSB: 15, 75, 78 & HSB: 6, 90, 95*). Compound color themes have the same strong visual contrast as complementary color themes, but they have less pressure.

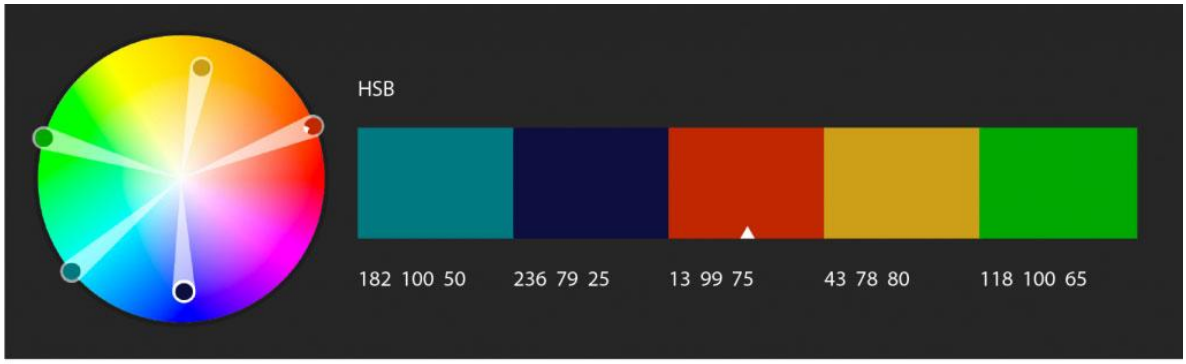
Example: Compound color rule

Shades Uses five colors—all sharing the same hue (example: *H: 182*) and saturation (*S: 100*) but different brightness values.



Shades color rule

Custom Lets you manually select the colors on the color wheel in your palette without any rules controlling them.



Custom color rule

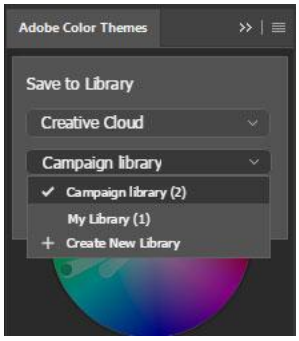
? Now, choose a base color by clicking the little triangle corresponding to a color in the theme you're editing. Based upon the color rule selected, a color theme is automatically built around the base color.

Choose a base color

*While a color is selected, you can adjust it either using the color wheel or by changing its value in one of the following color systems: **CMYK**, **RGB**, **LAB**, **HSB**, or **HEX**.*

1 Enter a name for the new color theme. Click **Save**.

2 Choose the Creative Cloud library to which you want to save the theme.



Save the new theme to a library

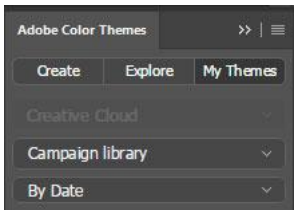
? Click **Save**.

Note:

Depending on whether you're logged in using your Adobe ID or your enterprise credentials, different sets of libraries may be available for saving themes. Select ***Help > Manage My Account*** *to check the credentials with which you're logged in. If you land at the authentication screen for your organization when you select this option, you're logged in using your enterprise credentials.*

The same email ID may be associated with an Adobe ID as well as an enterprise ID.

Access themes saved to your libraries



Access your themes

1 In the **Adobe Color Themes** panel, click the **My Themes** tab.

2 Select the Creative Cloud library from which you want to access the color theme.

3 If necessary, select a sorting parameter/order for the listed themes: **By Date**, **By Name**, or **By Quantity**; ascending or descending.

See also

- Color basics
- Adobe Capture CC FAQ
- Create inspiring color themes with Adobe Color CC

Dynamic Link and After Effects

Note: For more information on compatibility when using dynamic link between various versions of Premiere Pro and After Effects see the KB article, Using Dynamic Link between various versions of Premiere Pro and After Effects.

From an expert: Creative Dynamic Link workflows with Premiere Pro and After Effects

From an expert: Creative Dynamic Link workflows with Premiere Pro and After Effects

About Dynamic Link

In the past, sharing media assets among post-production applications required you to render and export your work from one application before importing it into another. This workflow was inefficient and time-consuming. If you wanted to change the original asset, you rendered and exported the asset again. Multiple rendered and exported versions of an asset consume disk space, and they can lead to file-management challenges.

Dynamic Link offers an alternative to this workflow. You can create dynamic links between **After Effects** and Adobe Premiere Pro. Creating a dynamic link is as simple as importing any other type of asset. Dynamically linked assets appear with unique icons and label colors to help you identify them. Dynamic links are saved in projects generated by these applications.

Create and link to After Effects compositions with Dynamic Link

You can create new **After Effects** compositions, and dynamically link to them from **Adobe Premiere Pro**. You can also dynamically link to existing **After Effects** compositions from Adobe Premiere Pro.

Create a composition from clips in Adobe Premiere Pro

You can replace selected clips in Adobe Premiere Pro with a dynamically linked **After Effects** composition based on those clips. The new composition inherits the sequence settings from **Adobe Premiere Pro**.

1. Open Premiere Pro and select the clips you want to replace.
2. Right-click any of the selected clips.
3. Select **Replace With After Effects Composition**.

   After Effects opens (if it is not already open) and a new linked composition is created.

Create a dynamically linked composition from Adobe Premiere Pro

Creating a new dynamically linked composition from Adobe Premiere Pro launches After Effects. After Effects then creates a project and composition with the dimensions, pixel aspect ratio, frame rate, and audio sample rate of the originating project. (If After Effects is already running, it creates a composition in the current project.) The new composition name is based on the Adobe Premiere Pro project name, followed by Linked Comp [x].

1. In Adobe Premiere Pro, choose **File > Adobe Dynamic Link > New After Effects Composition**. In the 2014 version of Premiere Pro, you can import compositions using Media Browser. See the following sections in Premiere Pro for more information:
   - Import files with Media Browser

- Adobe Dynamic Link

2 If the **After Effects Save As** dialog box appears, enter a name and location for the **After Effects** project, and click Save.

*When you create a dynamically linked After Effects composition, the composition duration is set to 30 seconds. To change the duration, select the composition in After Effects, choose **Composition** > **Composition Settings**. Click the **Basic** tab, and specify a new value for **Duration**.*

Link to an existing composition

For best results, match composition settings (such as dimensions, pixel aspect ratio, and frame rate) to the settings in the Adobe Premiere Pro.

? Do one of the following:

- In Adobe Premiere Pro, choose **File > Adobe Dynamic Link > ImportAfter Effects Composition.** Choose an After Effects project file (.aep), and then choose one or more compositions.
- In Adobe Premiere Pro, choose an After Effects project file and click Open. Then choose a composition in the displayed dialog box and click OK.
- Drag one or more compositions from the After Effects Project panel to the Adobe Premiere Pro Project panel.
- Drag an After Effects project file into the Premiere Pro Project panel. If the After Effects project file contains multiple compositions, the **Import Composition** dialog box opens.

Note:

You can link to a single After Effects composition multiple times in a single Adobe Premiere Pro project.

Modify a dynamically linked composition in After Effects

Use the **Edit Original** command in Adobe Premiere Pro to modify a linked After Effects composition. Once the composition is open in After Effects, you can change the composition without having to use the **Edit Original** command again.

1 Select the After Effects composition in Adobe Premiere Pro, or choose a linked clip in the Timeline, and choose **Edit > Edit Original**.

2 Change the composition in **After Effects**. Then, switch back to **Adobe Premiere Pro** to view your changes.

The changes made in After Effects appear in Adobe Premiere Pro. Adobe Premiere Pro stops using any preview files rendered for the clip before the changes.

Note:

*You can change the name of the composition in **After Effects** after creating a dynamic link to it from Adobe Premiere Pro. Adobe Premiere Pro does not update the linked composition name in the Project panel. Adobe Premiere Pro does retain the dynamic link, however.*

Delete a dynamically linked composition or clip

You can delete a linked composition from an Adobe Premiere Pro project at any time, even if the composition is used in a project.

You can delete linked clips from the timeline of an Adobe Premiere Pro sequence or timeline at any time.

? In Adobe Premiere Pro, select the linked composition or clip and press the Delete key.

Create a linked sequence in Adobe Premiere Pro with Dynamic Link

Link to a new sequence

Creating an Adobe Premiere Pro sequence from After Effects launches Adobe Premiere Pro. Adobe Premiere Pro then creates a project and sequence with the dimensions, pixel aspect ratio, frame rate, and audio sample rate of the originating project. (If Adobe Premiere Pro is already running, it creates a sequence in the current project.)

? In After Effects, choose **File > Adobe Dynamic Link > New Premiere Pro Sequence**.

Link to an existing sequence

For best results, match sequence settings and project settings in **Adobe Premiere Pro** (such as dimensions, pixel aspect ratio, and frame rate) to those settings in the **After Effects** project.

Do one of the following:

- In After Effects, choose **File > Adobe Dynamic Link > Import Premiere Pro Sequence**. Choose an Adobe Premiere Pro project, and then choose one or more sequences.
- Drag one or more sequences from the Adobe Premiere Pro Project panel to the After Effects Project panel.

Dynamic Link performance

A linked clip can refer to a complex source composition. Actions you perform on the source composition require additional processing time depending on the complexity. After Effects applies the actions and make the final data available to Adobe Premiere Pro using the global performance cache and the persistent disk cache features. These features improve the After Effects performance by using the cached frames when Premiere Pro requests the frames.

To reduce playback delays, do one of the following:

- Take the linked composition offline
- Disable a linked clip to temporarily stop referencing a composition
- Replace the dynamically linked composition with the rendered file using the Render and Replace feature in Premiere Pro (Clip > Render And Replace).

If you commonly work with complex source compositions, increase your RAM or upgrade to a faster processor.

Note:

A linked After Effects composition will not support Render Multiple Frames Simultaneously multiprocessing. See Improve performance by optimizing memory, cache, and multiprocessing settings.

Export to Adobe Media Encoder

To encode After Effects compositions, you must add the item to the encoding queue in Adobe Media Encoder, and then select encoding presets or create your own custom settings for rendering. In After Effects, you can add a composition to Media Encoder queue using one of the following options:

- File > Export > Add to Media Encoder Queue

- Composition > Add to Media Encoder Queue

When you add a composition or project to Adobe Media Encoder queue, After Effects launches Adobe Media Encoder with the compositions listed in the queue.

The encoding process is explained in the following articles:

- Encode video or audio items in Adobe Media Encoder
- Encode using presets
- Encode using custom settings

Chapter 3: Projects and compositions

Projects

About projects

An After Effects project is a single file that stores compositions and references to all the source files used by footage items in that project. Compositions are collections of layers. Many layers use footage items (such as movies or still images) as a source, though some layers—such as shape layers and text layers—contain graphics that you create within After Effects.

A project file has the filename extension *.aep* or *.aepx*. A project file with the *.aep* filename extension is a binary project file. A project file with the .aepx filename extension is a text-based XML project file.

The name of the current project appears at the top of the application window.

A template project file has the filename extension *.aet*. (See Template projects and example projects.)

XML project files

Text-based XML project files contain some project information as hexadecimal-encoded binary data, but much of the information is exposed as human-readable text in *string* elements. You can open an XML project file in a text editor and edit some details of the project without opening the project in After Effects. You can even write scripts that modify project information in XML project files as part of an automated workflow.

Elements of a project that you can modify in an XML project file:

- Marker attributes, including comments, chapter point parameters, and cue point parameters
- File paths of source footage items, including proxies
- Composition, footage item, layer, and folder names and comments

Note:

Footage item names are exposed in string elements in XML project files only if the names have been customized. Footage item names derived automatically from the names of source files and solid color names are not exposed in string elements

Some strings, such as workspace and view names, are exposed as human-readable strings, but modifications made to these strings are not respected when After Effects opens the project file.

Note:

Do not use the XML project file format as your primary file format. The primary project file format for After Effects is the binary project file (.aep) format. Use the XML project file format to save a copy of a project and as an intermediate format for automation workflows.

To save an XML project (.aepx) file as a binary project (.aep) file, choose File > Save As and enter a filename ending with .aep, without the x. (See Save and backup projects in After Effects.)

Project links embedded in QuickTime, Video for Windows files

When you render a movie and export it to a container format, you can embed a link to the After Effects project in the container file.

To import the project, import the container file, and choose Project from the Import As menu in the Import File dialog box. If the container file contains a link to a project that has been moved, you can browse to locate the project.

Create and open projects

Only one project can be open at a time. If you create or open another project file while a project is open, After Effects prompts you to save changes in the open project, and then closes it. After you create a project, you can import footage into the project.

- To create a project, choose File > New > New Project.
- To open a project, choose File > Open Project, locate the project, and then click Open.

You can also create and open a project from the Start screen.

- To create a project, click **New Project**.
- To open a project, click **Open Project** and navigate to the location of the project.

Jeff Almasol provides a script on his redefinery website that creates and saves a new project for each selected composition in the current project.

Template projects and example projects

A template project is a file with the filename extension .aet. You can create templates based on your projects.

Note:

After Effects does not install template projects.

When you open a template project, After Effects creates a new, untitled project based on the template. Saving changes to this new project does not affect the template project.

A great way to see how advanced users use After Effects is to open one of the template projects included with After Effects, open a composition to activate it, and press U or UU to reveal only the animated or modified layer properties. Viewing the animated and modified properties shows you what changes the designer of the template project made to create the template.

Often, the creator of a template project locks layers that are to be left unmodified, and leaves layers to be modified unlocked. It is a convenient way to prevent accidental or inappropriate modifications.

For more sources of After Effects example projects and template projects, see After Effects community resources on the Adobe website.

See this video tutorial by Andrew Devis on the Creative COW website for information about where to find template projects and sample expressions included with After Effects.

Open a template project

- To open a template project, choose File > Open Project. On Windows, choose Adobe After Effects Project Template from the Files Of Type menu.

Create a template project

- To convert a project to a template project, change the filename extension from .aep to .aet.
- To save a copy of a project as a template project, choose File > Save A Copy, and then rename the copy with the filename extension .aet.

Set a template for new projects

You can create a template with your preferred project settings such as color management and folder structure, and use it as a foundation for every new project you create.

To set a template for your new After Effects projects:

1. Choose **Edit > Preferences > New Project**.
2. Enable the **New project loads template** check box.
3. Click **Choose Project Template** and select a template file.

Note:

The format of the template project can be .aet, .aep, or .aex.

Video

Team Projects

Team Projects is a hosted collaboration service for CC enterprise and CC teams users that enables editors to seamlessly collaborate in the editing workflow in real time. Using Team Projects, editors and motion graphics artists can work simultaneously in shared team projects within Adobe Premiere Pro, After Effects, and Adobe Prelude without any additional hardware.

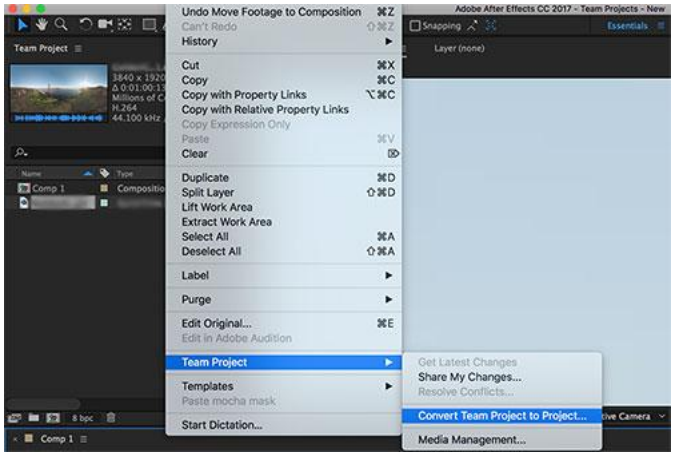
The project updates are securely tracked in the cloud and the source files are saved locally or in lightweight, shared proxies. Team Projects also include deep collaboration features like version control and smart conflict resolution.

- To create a team project, choose **File > New > New Team Project**.
- To open a team project, choose **File > Open Team Project.**

For detailed information on how to use Team Projects for your collaborative workflow, see Working simultaneously in shared video projects.

Convert Team Project to an Adobe After Effects Project

You can convert your Team projects to a local Adobe After Effects Project (.aep). Select **Edit > Team Projects > Convert Team Project to Project**.



Converting Team Project to an Adobe After Effects Project

Save and back up projects in After Effects

- To save a project, choose **File > Save**.
- To save a copy of the project with a new automatically generated name, choose **File > Increment And Save**, or press *Ctrl+Alt+Shift+S* (Windows) or *Command+Option+Shift+S* (Mac OS).
- A copy of the current project is saved in the same folder as the original project. The name of the copy is the name of the original followed by a number. If the name of the original ends with a number, that number is increased by 1.
- To save the project with a different name or to a different location, choose **File > Save As > Save As**. The open project takes the new name and location; the original file remains unchanged.
- To save the project as a copy in the XML project file format, choose **File > Save As > Save A Copy As XML**. (See About projects.)
- To save a copy of the project with a different name or to a different location, choose **File > Save As > Save A Copy.** The open project retains its original name and location, and a copy is created with the new settings but is not opened.
- To save a copy of a project to be opened by the previous major version, choose **File > Save As > Save A Copy As** <previous major version number>. (For more information, see this blog.)

Note:

New features in the current version of After Effects that are used in a project are ignored in the project that is saved in the format of the previous version of After Effects.

To save a copy of the project and copies of assets used in the project to a single folder on disk, use the Collect Files command. (See Collect files in one location section for details).

Flowchart panel

In the flowchart for each project or composition, individual boxes (or tiles) represent each composition, footage item, and layer. Directional arrows represent the relationships between components.

Note:

The Flowchart panel shows you only the existing relationships. You cannot use it to change relationships between elements.

Nested compositions and other elements that make up the composition appear when you expand a composition tile.

Mid-gray lines between tiles in the flowchart indicate that the Video or Audio switch for those items is deselected in the Timeline panel. Black or light gray lines indicate that the switch is selected, depending on the Brightness setting in the Appearance preferences.

- To open the project flowchart, press Ctrl+F11 (Windows) or Command+F11 (Mac OS), or click the Project Flowchart button at the top of the vertical scroll bar on the right edge of the Project panel.
- To open a composition flowchart, select the composition and choose Composition > Composition Flowchart, or click the Composition Flowchart button at the bottom of the Composition panel.
- To activate (select) an item, click its tile in the Flowchart panel.

  When you click a composition in the flowchart, it becomes active in the Project panel and the Timeline panel. When you click a layer, it becomes active in the Timeline panel. When you click a footage item, it becomes active in the Project panel.
- To customize the appearance of the flowchart, use the Flowchart panel menu and the buttons along the bottom of the panel.

For tool tips identifying the buttons in the Flowchart panel, let your pointer hover over a button until the tool tip appears.

- To delete elements, select them and press Delete. If the selected element is a footage item or composition, it is deleted from the project and no longer appears in the Timeline and Project panels. If the selected element is a layer, it is deleted from the composition in which it appears.
- To access the context menu for a selected element, right-click (Windows) or Control-click (Mac OS) the icon to the left of the name in the element tile. The icons have various appearances, depending on the element type, such as layers and compositions. For example, you can use the context menu for a layer to work with masks and effects, or to change switches, apply transformations, and adjust layer image quality.

Note:

When you change element properties in the Flowchart panel, be careful to context-click the icon in the tile, not the name of the element. The context menu associated with the element icon is different from the one that opens from the element name.

Rich Young provides additional information about the Flowchart panel and the Composition Mini-flowchart on the After Effects Portal website.

CINEMA 4D Composition Renderer

The CINEMA 4D Composition renderer is the new 3D renderer in After Effects. It is a tool for extrusion of text and shapes and the preferred renderer for extruded 3D work. You can use this renderer to create faster 3D animations from scratch. The CINEMA 4D Composition renderer does the following:

- Generates interactive 3D text, logos, and curved 2D planes within After Effects without using any specific hardware.
- Allows you to control the quality and render settings with a single slider while the camera, lighting, and text animation remains the same.

Basics of Composition Settings

1 You can access the 3D Renderer tab by any of the following options given below:

In the Composition Settings dialog, click **3D Renderer** tab.

2 Click **Renderer** and choose **CINEMA 4D** from the drop-down list.

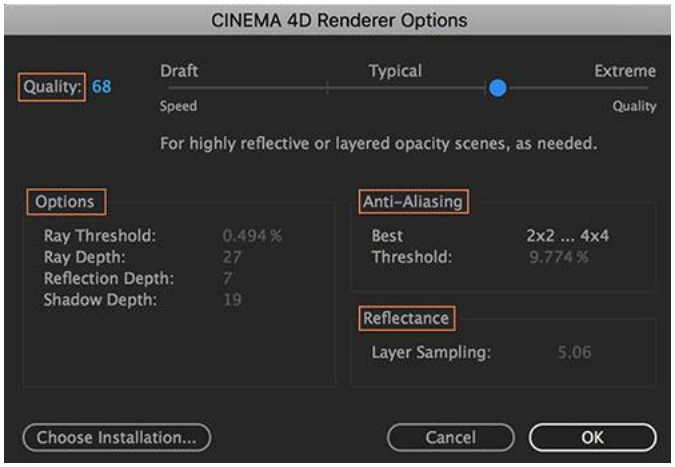
You can also access the 3D Renderer tab by clicking **Renderer** in the Comp panel.

Supported features in CINEMA 4D Composition Renderer

The CINEMA 4D Composition Renderer supports the following features to help you create high-quality 3D text and logos:

- **Extrude and bevel text and shape layers:** Extrude text and shape layers creates 3D objects that have depth and do not look flat when a camera or light moves around them. Bevel controls the look of the edges of the extruded object. For more information, see Creating beveled and extruded text and shape layers.
- **Reflections:** Manipulates the reflection and reflectiveness of 3D objects in your composition. For more information, see Reflection.
- **Curved footage layers:** Adjusts the curve intensity of 3D footage layers and nested composition layers around a vertical axis using the Geometry Options- Curvature and Segments. For more information, see Bending a footage layer.
- **Material overrides on text/shape bevel and sides:** Uses existing text animator and shape operator support to override the Material properties. The Fill Color, Stroke Color, and Stroke Width options are replaced with the Front, Bevel, Side, and Back options in the pop-up menu. For more information, see Override material properties.
- **Environment layer (in reflection only):** Dictates the usage of the Environment map in the scene. For more information, see Environment layer.

Using the Quality Slider



Quality Slider Settings

Use the **Quality** slider to adjust the rendering quality of the composition. Higher-quality outputs require longer rendering time. The quality settings determine how the CINEMA 4D renderer draws the 3D layers.

To access the slider:

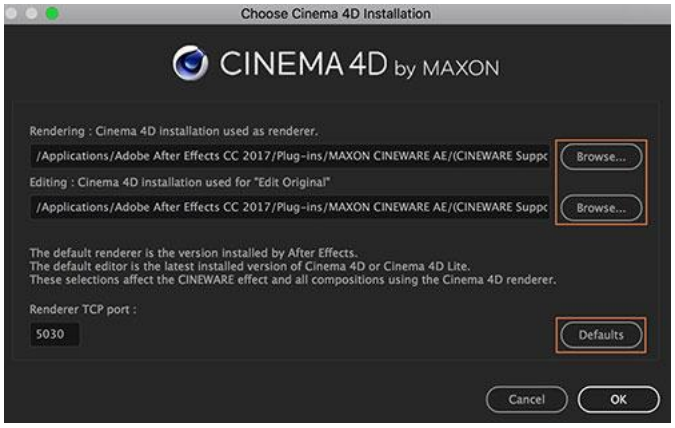
1 Click **Options** in the Composition Settings window. You can also click the Wrench icon (Options) in the Comp panel.

2 In the CINEMA 4D Renderer Options dialog, the **Quality Slider** ranges from Draft, Typical, and Extreme.

- **Draft:** Settings in the Draft range are used for preview quality renders. It takes the least time to draw the 3D layers.
- **Typical:** Settings in the Typical range are used for most final renders
- **Extreme:** Settings in the Extreme range are used for scenes containing complex opacity or highly reflective elements.

3 The variation in the range of the Quality slider affects the Ray Threshold, Ray Depth, Reflection Depth, Shadow Depth, Anti-Aliasing, and Reflectance settings of the composition. For more information, see CINEMA 4D Renderer Options.

Choosing a CINEMA 4D Installation


Choose Cinema 4D Installation
CINEMA 4D by MAXON
Rendering : Cinema 4D installation used as renderer.
/Applications/Adobe After Effects CC 2017/Plug-ins/MAXON CINEWARE AE/(CINEWARE Suppc
Browse...
Editing : Cinema 4D installation used for "Edit Original"
/Applications/Adobe After Effects CC 2017/Plug-ins/MAXON CINEWARE AE/(CINEWARE Suppc
Browse...
The default renderer is the version installed by After Effects.
The default editor is the latest installed version of Cinema 4D or Cinema 4D Lite.
These selections affect the CINEWARE effect and all compositions using the Cinema 4D renderer.
Renderer TCP port :
5030
Defaults
Cancel
OK

Choose CINEMA 4D Installation

Renderer Settings

You can change the renderer from the default Renderer to the full retail version of CINEMA 4D if you have it installed. To reset the default renderer, click Defaults.

Choosing a CINEMA 4D installation:

1 In the Composition Settings window, click Render Options.

2 CINEMA 4D Renderer Options dialog opens up. Click **Choose Installation**.

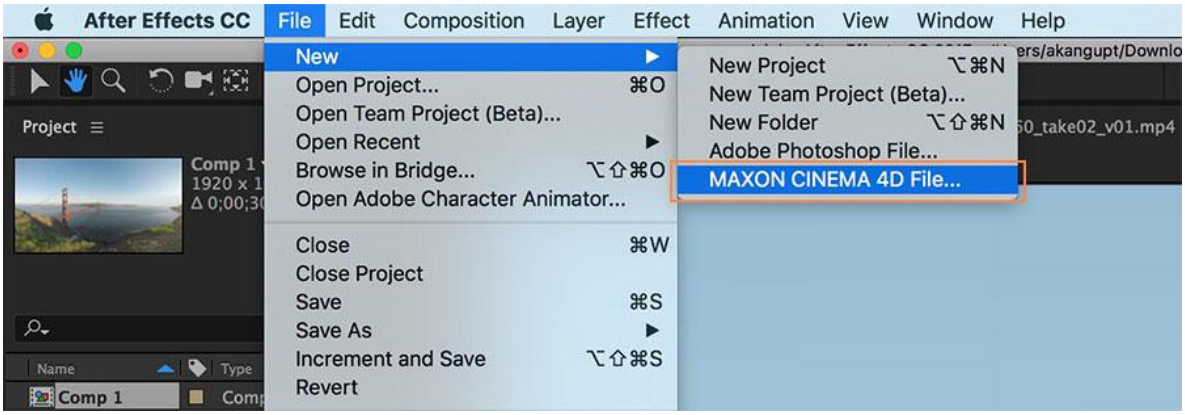
3 In the **Choose CINEMA 4D Installation** dialog, browse and select the path to the installation.

Editor Settings

The Editing setting applies to the Cineware workflow and determines what version of C4D opens. The default editor is the latest installed version of CINEMA 4D or CINEMA 4D Lite.

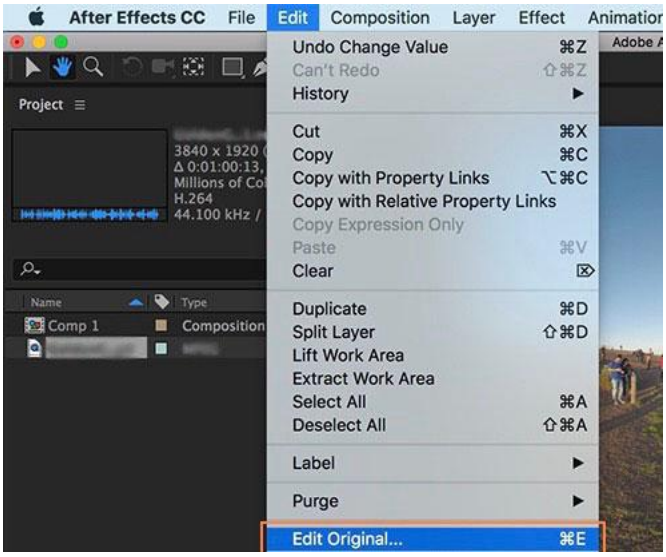
Use any of the following options to open the selected Editor:

1 Select **File > New > MAXON CINEMA 4D File**.



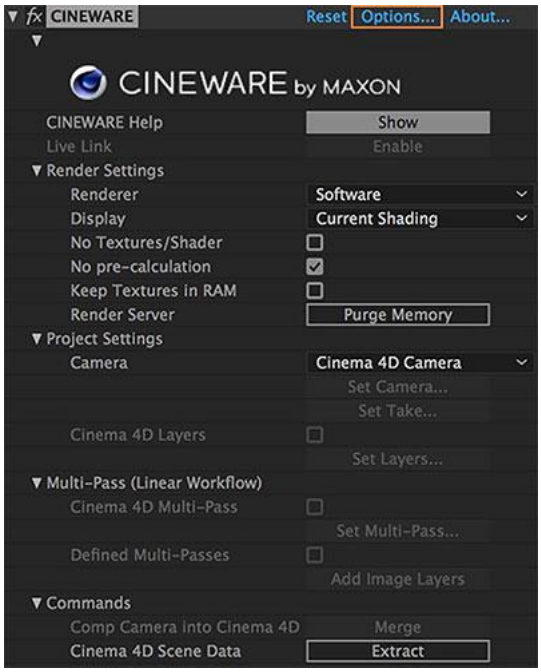
Path to open selected Editor

2 Or, select a CINEMA 4D source or layer and choose **Edit > Edit Original**.



Path to open selected Editor

Shared CINEMA 4D Installation



Cineware Settings

The **Choose CINEMA 4D Installation** dialog is shared with the Cineware effect. You can also access it by clicking **Options** in the **Effect Controls** panel via the Cineware effect.

Do more with After Effects

Create incredible motion graphics, text animation, and visual effects with Adobe After Effects. Design for film, TV, video, and web.

Composition basics

About compositions

A composition is the framework for a movie. Each composition has its own timeline. A typical composition includes multiple layers that represent components such as video and audio footage items, animated text and vector graphics, still images, and lights. You add a footage item to a composition by creating a layer for which the footage item is the source. You then arrange layers within a composition in space and time, and composite using transparency features to determine which parts of underlying layers show through the layers stacked on top of them. (See Layers and properties and Transparency and compositing.)

A composition in After Effects is similar to a movie clip in Flash Professional or a sequence in Premiere Pro.

You render a composition to create the frames of a final output movie, which is encoded and exported to any number of formats. (See Basics of rendering and exporting.)

Simple projects may include only one composition; complex projects may include hundreds of compositions to organize large amounts of footage or many effects.

In some places in the After Effects user interface, composition is abbreviated as comp.

Each composition has an entry in the Project panel. Double-click a composition entry in the Project panel to open the composition in its own Timeline panel. To select a composition in the Project panel, right-click (Windows) or Control-click (Mac OS) in the Composition panel or Timeline panel for the composition and choose Reveal Composition In Project from the context menu.

Use the Composition panel to preview a composition and modify its contents manually. The Composition panel contains the composition frame and a pasteboard area outside the frame that you can use to move layers into and out of the composition frame. The offstage extents of layers—the portions not in the composition frame—are shown as rectangular outlines. Only the area inside the composition frame is rendered for previews and final output.

The composition frame in the Composition panel in After Effects is similar to the Stage in Flash Professional.

When working with a complex project, you may find it easiest to organize the project by nesting compositions—putting one or more compositions into another composition. You can create a composition from any number of layers by precomposing them. After modifying some layers of your composition, you can precompose those layers and then pre-render the precomposition, replacing it with a rendered movie. (See Precomposing, nesting, and pre-rendering.)

You can navigate within a hierarchy of nested compositions using the Composition Navigator and Composition Mini-Flowchart. (See Opening and navigating nested compositions.)

Use the Flowchart panel to see the structure of a complex composition or network of compositions.

Timeline button Click this button at the bottom of the Composition panel to activate the Timeline panel for the current composition.

Press the backslash (\) key to switch activation between the Composition panel and Timeline panel for the current composition.

Comp button Click this button in the upper-right corner of the Timeline panel to activate the Composition panel for the current composition.

Flowchart button Click this button at the bottom of the Composition panel to activate the Flowchart panel for the current composition.

Create a composition

You can change composition settings at any time. However, it's best to specify settings such as frame aspect ratio and frame size when you create the composition, with your final output in mind. Because After Effects bases certain calculations on these composition settings, changing them late in your workflow can affect your final output.

Note:

You can override some composition settings when rendering to final output. For example, you can use different frame sizes for the same movie. For more information, see Render settingsand Output modules and output module settings.

When you create a composition without changing settings in the Composition Settings dialog box, the new composition uses the settings from the previous time that composition settings were set.

Note:

New compositions do not inherit the previous Preserve Frame Rate When Nested Or In Render Queue and Preserve Resolution When Nested settings.

Jeff Almasol provides a script on his redefinery website that creates and saves a new project for each selected composition in the current project. If a folder is selected in the Project panel when you create a new composition, the new composition is placed in the selected folder.

Create a composition and manually set composition settings

? Choose Composition > New Composition, or press Ctrl+N (Windows) or Command+N (Mac OS).

Create a composition from a single footage item

? Drag the footage item to the Create A New Composition button at the bottom of the Project panel or choose File > New Comp From Selection.

Composition settings, including frame size (width and height) and pixel aspect ratio, are automatically set to match the characteristics of the footage item.

Create a single composition from multiple footage items

1 Select footage items in the Project panel.

2 Drag the selected footage items to the Create A New Composition button at the bottom of the Project panel, or choose File > New Comp From Selection.

3 Select Single Composition and other settings in the New Composition From Selection dialog box:

Use Dimensions From Choose the footage item from which the new composition gets composition settings, including frame size (width and height) and pixel aspect ratio.

Still Duration The duration for the still images being added.

Add To Render Queue Add the new composition to the render queue.

Sequence Layers, Overlap, Duration, and Transition Arrange the layers in a sequence, optionally overlap them in time, set the duration of the transitions, and choose a transition type.

Create multiple compositions from multiple footage items

1 Select footage items in the Project panel.

2 Drag the selected footage items to the Create A New Composition button at the bottom of the Project panel, or choose File > New Comp From Selection.

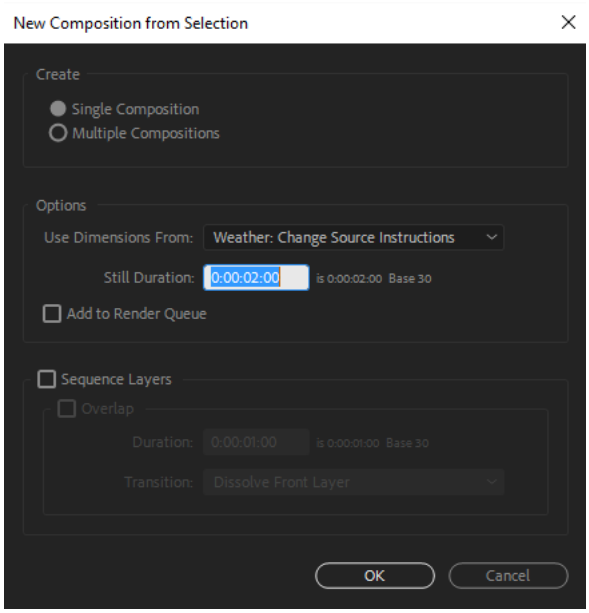
3 Select Multiple Compositions and other settings in the New Composition From Selection dialog box:

Still Duration The duration of the compositions created from still images.

Add To Render Queue Add the new compositions to the render queue.

Note:

If you select multiple footage items, the New Composition From Selection dialog is displayed. You can choose whether to create a single composition with all footage items or multiple compositions for each individual footage item.



Composition selection

Duplicate a composition

1. Select the composition in the Project panel.
2. Choose Edit > Duplicate or press Ctrl+D (Windows) or Command+D (Mac OS).

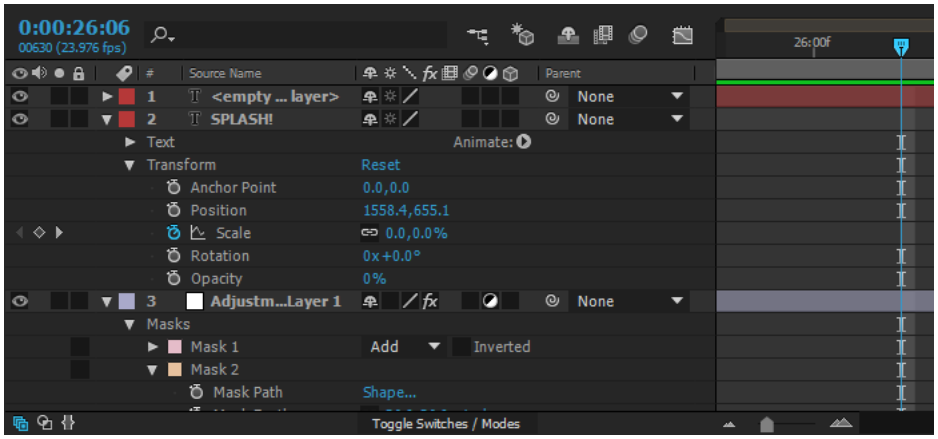
Timeline panel

Each composition has its own Timeline panel. You use the Timeline panel to perform many tasks, such as animating layer properties, arranging layers in time, and setting blending modes. The layers at the bottom of the layer stacking order in the Timeline panel are rendered first and—in the case of 2D image layers— appear farthest back in the Composition panel and in the final composite.

To cycle forward through Timeline panels, press Alt+Shift+period (.) (Windows) or Option+Shift+period (.) (Mac OS). To cycle backward through Timeline panels, press Alt+Shift+comma (,) (Windows) or Option+Shift+comma (,) (Mac OS).

The current time for a composition is indicated by the current-time indicator (CTI), the vertical red line in the time graph. The current time for a composition also appears in the current time display in the upper-left corner of the Timeline panel. For more information on moving the current-time indicator, see Move the current-time indicator (CTI).

The left side of the Timeline panel consists of columns of controls for layers. The right side of the Timeline panel—the time graph—contains a time ruler, markers, keyframes, expressions, duration bars for layers (in layer bar mode), and the Graph Editor (in Graph Editor mode).



Press the backslash (\) key to switch activation between the Composition panel and Timeline panel for the current composition.

Composition settings

You can enter composition settings manually, or you can use composition settings presets to automatically set frame size (width and height), pixel aspect ratio, and frame rate for many common output formats. You can also create and save your own custom composition settings presets for later use. Resolution, Start Timecode (or Start Frame), Duration, and Advanced composition settings are not saved with composition settings presets.

Note:

The limit for composition duration is three hours. You can use footage items longer than three hours, but time after three hours does not display correctly. The maximum composition size is 30,000x30,000 pixels. A 30,000x30,000 8-bpc image requires approximately 3.5 GB; your maximum composition size may be less, depending on your operating system and available RAM.

Working with composition settings

- To open the Composition Settings dialog box to change composition settings, do one of the following:
  - Select a composition in the Project panel or activate the Timeline or Composition panel for a composition, and choose Composition > Composition Settings, or press Ctrl+K (Windows) or Command+K (Mac OS).
  - Right-click (Windows) or Control-click (Mac OS) a composition in the Project panel or Composition panel (not on a layer), and choose Composition Settings from the context menu.
- To save a custom composition settings preset, set Width, Height, Pixel Aspect Ratio, and Frame Rate values in the Composition Settings dialog box, and then click the Save button .
- To delete a composition settings preset, choose it from the Preset menu in the Composition Settings dialog box, and click the Delete button .
- To restore default composition settings presets, Alt-click (Windows) or Option-click (Mac OS) the Delete button or the Save button in the Composition Settings dialog box.

Note:

You cannot move custom composition settings presets from one system to another, as they are embedded into the preferences file.

- To scale an entire composition, choose File > Scripts > Scale Composition.jsx.

Note:

Ensure that all layers are unlocked in the selected composition or the script fails.

Jeff Almasol provides a script on his redefinery website to set the frame rate and duration of the current composition and all compositions nested within it.

Christopher Green provides a script (Selected_Comps_Changer.jsx) on his website with which you can change the composition settings for compositions selected in the Project panel.

Basic composition settings

Start Timecode or Start Frame Timecode or frame number assigned to the first frame of the composition. This value does not affect rendering; it merely specifies where to start counting from.

Background Color Use the color swatch or eyedropper to pick a composition background color. (See Select a color or edit a gradient.)

note: When you add one composition to another (nesting), the background color of the containing composition is preserved, and the background of the nested composition becomes transparent. To preserve the background color of the nested composition, create a solid-color layer to use as a background layer in the nested composition.

For information on specific Basic composition settings not listed here, see the related sections:

- Pixel aspect ratio and frame aspect ratio
- Frame rate
- Resolution

Advanced composition settings

Anchor

Click an arrow button to anchor layers to a corner or edge of the composition as it is resized.

Preserve resolution when nested and **Preserve frame rate when nested or in render queue**

For a composition to retain its own resolution or frame rate, and not inherit those settings from the containing composition. For example, if you have deliberately used a low frame rate in a composition to create a jerky, hand-animated result, you must preserve the frame rate for that composition when it is nested. Similarly, the results of rotoscoping may look wrong when converted to a different frame rate or resolution. Use this setting instead of the Posterize Time effect, which is less efficient.

Motion Blur settings

- **Shutter angle**: The shutter angle is measured in degrees, simulating the exposure allowed by a rotating shutter. The shutter angle uses the footage frame rate to determine the simulated exposure, which affects the amount of motion blur. For example, entering 90° (25% of 360°) for 24-fps footage creates an effective exposure of 1/96 of a second (25% of 1/24 of a second). Entering 1° applies almost no motion blur, and entering 720° applies a large amount of blur.
- **Shutter phase**: The shutter phase is also measured in degrees. It defines an offset that determines when the shutter opens relative to the beginning of a frame. Adjusting this value can help if an object with motion blur applied appears to lag behind the position of the object without motion blur applied.

- **Samples per frame**: The minimum number of samples. This minimum is the number of samples used for frames for which After Effects is not able to determine an adaptive sampling rate based on layer motion. This sample rate is used for 3D layers and shape layers.
- **Adaptive sample limit**: The maximum number of samples.

For information on specific Advanced composition settings not listed here, see the related sections:

- Specify resolution to use for rendering shadows
- Preferences and composition settings that affect nested compositions
- Motion blur

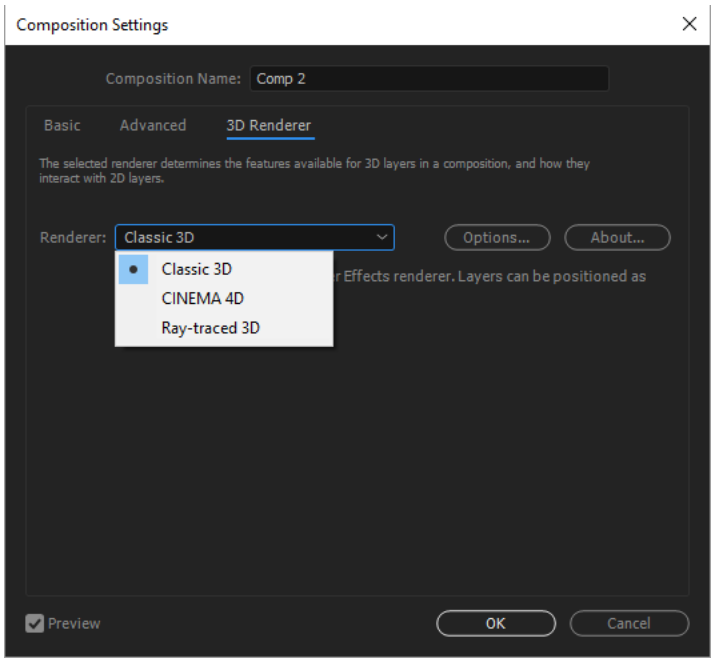
3D renderer settings

You can use the options in the 3D renderer tab to choose the right 3D renderer for your composition. You can choose from the following renderers in the Renderer menu:

- **Classic 3D**
- **CINEMA 4D**
- **Ray-traced 3D**

The 3D functionality of the CINEMA 4D Composition Renderer and the Ray-traced 3D renderer is nearly identical with the extrusion of 3D text and shape layers and bending of other 3D layers (solids, footage, and so on) into curved planes. However, the rendered results can be different because they generate results using different renderers and support different sets of features. For example, there are differences in the 3D layer material options and other layer behaviors.

The CINEMA 4D Composition Renderer renders 3D layers including extruded text and shapes and curved 2D planes to make the process of animating 3D text and logos from scratch easier. The performance of the CINEMA 4D renderer is much faster than the CPU-only performance of the Ray-traced 3D renderer.



3D renderer tab

Classic 3D renderer

Classic 3D is the traditional, default renderer. Layers are positioned as planes in 3D space.

CINEMA 4D Composition Renderer options

Quality: The Quality level that you set on the slider affects the parameters that determine how the CINEMA 4D Composition Renderer draws the 3D layers. You can see the resultant renderer parameters in the Options, Anti-aliasing, and Reflectance boxes. The single Quality setting makes it easy for you to choose a balanced combination of rendering speed and acceptable 3D rendering quality without understanding and modifying the various rendering quality parameters.

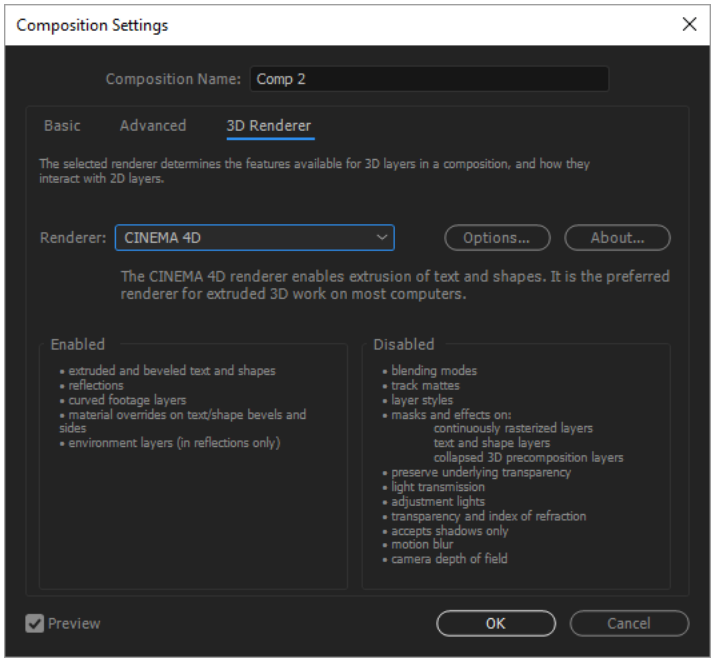
The following parameters are modified when you adjust the Quality slider**:**

- **Ray Threshold**: This value helps to optimize render time.
- **Ray Depth**: The Ray Depth determines how many transparent objects (or areas made invisible using the alpha channel) can be penetrated by the renderer.
- **Reflection Depth**: When a ray is sent into the scene, it can be reflected by reflective surfaces. The higher the Reflection Depth, the further rays are followed into the scene and the results rendered.
- **Shadow Depth**: Shadow Depth behaves analogous to the Reflection Depth. The Shadow Depth setting defines the shadow depth with which visible shadow rays are calculated.

Anti-Aliasing: Geometry is the default anti-aliasing setting that smooths all object edges (automatically with 16x16 sub-pixels).

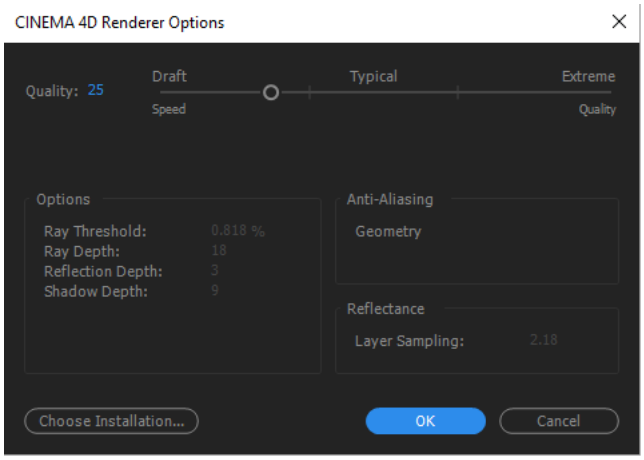
Reflectance: Layer sampling is the default Reflectance setting that defines the quality of matte reflections.

When you select CINEMA 4D in the Renderer drop-down box, the Enabled column displays the 3D options that are enabled and the Disabled column displays the 3D options that are not available.


Composition Settings
Composition Name: Comp 2
Basic
Advanced
3D Renderer
The selected renderer determines the features available for 3D layers in a composition, and how they interact with 2D layers.
Renderer: CINEMA 4D
Options...
About...
The CINEMA 4D renderer enables extrusion of text and shapes. It is the preferred renderer for extruded 3D work on most computers.
Enabled
• extruded and beveled text and shapes
• reflections
• curved footage layers
• material overrides on text/shape bevels and sides
• environment layers (in reflections only)
Disabled
• blending modes
• track mattes
• layer styles
• masks and effects on:
continuously rasterized layers
text and shape layers
collapsed 3D precomposition layers
• preserve underlying transparency
• light transmission
• adjustment lights
• transparency and index of refraction
• accepts shadows only
• motion blur
• camera depth of field
Preview
OK
Cancel

CINEMA 4D Render options

To choose a quality level for your 3D rendering, click the Options button after selecting **CINEMA 4D** as the renderer and set the quality level using the **Quality** slider. The values of Ray Threshold, Ray Depth, Reflection Depth, Shadow Depth, Anti-Aliasing, and Reflectance change acccordingly.

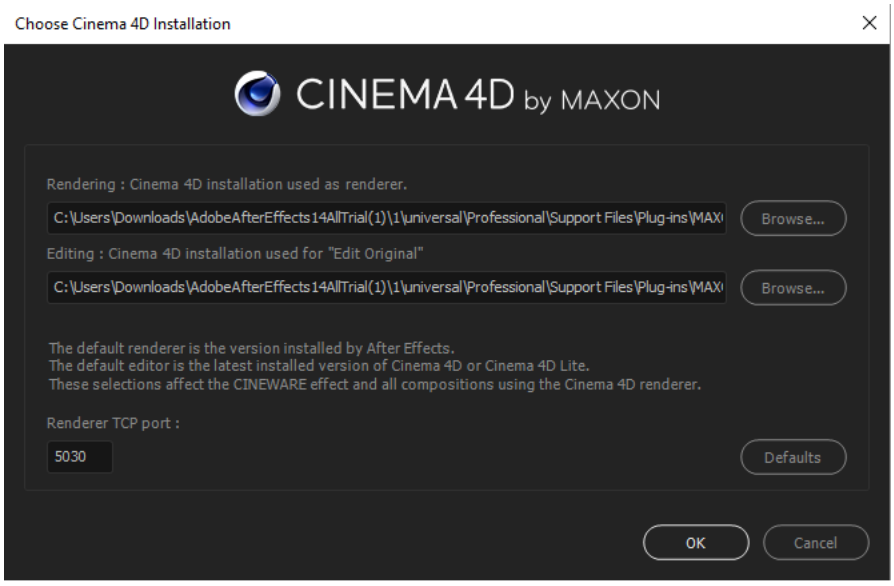


Quality Slider Settings

After Effects installs a default Renderer on your machine. You can change the Renderer to a full retail version of CINEMA 4D, if you have it installed.

The default Editor is the latest installed version of CINEMA 4D and Cinewareor CINEMA 4D Lite.

To select another CINEMA 4D installation, click **Choose Installation** and select the path to the installer in the Rendering and Editing boxes.CINEMA 4D and Cineware


Choose Cinema 4D Installation
CINEMA 4D by MAXON
Rendering : Cinema 4D installation used as renderer.
C:\Users\Downloads\AdobeAfterEffects14AllTrial(1)\1\universal\Professional\Support Files\Plug-ins\MAX
Browse...
Editing : Cinema 4D installation used for "Edit Original"
C:\Users\Downloads\AdobeAfterEffects14AllTrial(1)\1\universal\Professional\Support Files\Plug-ins\MAX
Browse...
The default renderer is the version installed by After Effects.
The default editor is the latest installed version of Cinema 4D or Cinema 4D Lite.
These selections affect the CINEWARE effect and all compositions using the Cinema 4D renderer.
Renderer TCP port :
5030
Defaults
OK
Cancel

Choose CINEMA 4D Installation

Ray-traced 3D render options

Click the Options button to launch the Ray-traced 3D Renderer Options dialog box. You can also Ctrl-click (Windows) or Command-click (Mac OS) the Current Renderer Indicator button in the upper-right of the Composition panel to launch the dialog box.

Here you can choose:

- **Ray-tracing quality**: Click the Ray-tracing quality setting to change it according to your workflow.
  - Higher values for ray-tracing quality decrease noise but greatly increase render time. Ray-tracing quality controls the number of rays fired per pixel (for example, a value of 4 fires 16 or 4x4 rays, and 8 fires 64 rays).
  - A larger number produces a more accurate pixel at the expense of computation time.
  - A value of 1 provides better performance, but there won't be any reflection blur (for example, it is always sharp), soft shadow, depth of field, or motion blur.

Increasing the Ray-tracing Quality value does not increase the sharpness. Instead it decreases the noise inherent in point sampling. Use the lowest value that produces an acceptable amount of noise or no noise.

- **Anti-aliasing Filter**: Controls the method of averaging the fired rays for a pixel. None fires all rays within the bounds of a pixel, whereas the others spread the grid of fired rays partially across adjacent pixels to produce a better average. Box, Tent, and Cubic (which is not bicubic) are listed in the order of better quality.
  - None
  - Box
  - Tent
  - Cubic

The anti-aliasing filter controls the amount of blurriness. None gives the sharpest result but the edges of the projection catcher may look aliased, with Box blur, Triangle, and Cubic giving blurrier results.

Note:

Ray-traced 3D layers use Ray-tracing Quality to control the appearance of motion blur.

Depth of field calculations in Ray-traced 3D are more accurate than they are in Classic 3D (and previously in Advanced 3D).

Composition thumbnail images

You can choose which frame of a composition to show as a thumbnail image (poster frame) for the composition in the Project panel. By default, the thumbnail image is the first frame of the composition, with transparent portions shown as black.

- To set the thumbnail image for a composition, move the current-time indicator to the desired frame of the composition in the Timeline panel, and choose Composition > Set Poster Time.
- To add a transparency grid to the thumbnail view, choose Thumbnail Transparency Grid from the Project panel menu.
- To hide the thumbnail images in the Project panel, choose Edit > Preferences > Display (Windows) or After Effects > Preferences > Display (Mac OS) and select Disable Thumbnails In Project Panel.

Precomposing, nesting, and pre-rendering

About precomposing and nesting

If you want to group some layers that are already in a composition, you can *precompose* those layers. Precomposing layers places them in a new composition, which replaces the layers in the original composition. The new nested composition becomes the source for a single layer in the original composition. The new composition appears in the Project panel and is available for rendering or use in any other composition. You can nest compositions by adding an existing composition to another composition, just as you would add any other footage item to a composition. Precomposing a single layer is useful for adding transform properties to a layer and influencing the order in which elements of a composition are rendered.

Nesting is the inclusion of one composition within another. The nested composition appears as a layer in the containing composition.

A nested composition is sometimes called a *precomposition*, which is occasionally abbreviated in casual use to *precomp* or *pre-comp*. When a precomposition is used as the source footage item for a layer, the layer is called a *precomposition layer*.

During rendering, the image data and other information can be said to *flow* from each nested composition into the composition that contains it. For this reason, nested compositions are sometimes referred to as being *upstream* of the compositions that contain them, and the containing compositions are said to be *downstream* of the nested compositions that they contain. A set of compositions connected through nesting is called a *composition network*. You can navigate within a composition network using the Composition Navigator and Mini-Flowchart. (See Opening and navigating nested compositions.)

Precompositions in After Effects are similar to Smart Objects in Adobe Photoshop.

Uses for precomposing and nesting

Precomposing and nesting are useful for managing and organizing complex compositions. By precomposing and nesting, you can do the following:

- **Apply complex changes to an entire composition** - You can create a composition that contains multiple layers, nest the composition within the overall composition, and animate and apply effects to the nested composition so that all the layers change in the same ways over the same time period.
- **Reuse anything you build** - You can build an animation in its own composition and then drag that composition into other compositions as many times as you want.
- **Update in one step** - When you make changes to a nested composition, those changes affect every composition in which it is used, just like changes made to a source footage item affect every composition in which it is used.
- **Alter the default rendering order of a layer** - You can specify that After Effects render a transformation (such as rotation) before rendering effects, so that the effect applies to the rotated footage.
- **Add another set of transform properties to a layer** - The layer that represents the composition has its own properties, in addition to the properties of the layers that it contains. This allows you to apply an additional set of transformations to a layer or set of layers.

Preferences and composition settings that affect nested compositions

Because a precomposition is itself a layer, you can control its behavior using layer switches and composition switches in the Timeline panel. You can choose whether changes made to the switches in the containing composition are propagated to the nested composition. To prevent layer switches from affecting nested compositions, choose Edit > Preferences > General (Windows) or After Effects > Preferences > General (Mac OS), and then deselect Switches Affect Nested Comps.

In the Advanced tab of the Composition Settings dialog box (Composition > Composition Settings), choose Preserve Resolution When Nested or Preserve Frame Rate When Nested Or In Render Queue for a composition to retain its own resolution or frame rate, and not inherit those settings from the containing composition. For example, if you deliberately used a low frame rate in a composition to create a jerky, hand-animated result, you should preserve the frame rate for that composition when it is nested. Similarly, the results of rotoscoping may look wrong when converted to a different frame rate or resolution. Use this setting instead of the Posterize Time effect, which is less efficient.

Jeff Almasol provides a script on his redefinery website that makes toggling the Preserve Resolution When Nested or Preserve Frame Rate When Nested Or In Render Queue preference setting more convenient.

Changing the current time in one panel updates the current time in other panels associated with that composition. By default, the current time is also updated for all compositions related to the current composition by nesting. To prevent compositions related by nesting from updating their current times when you change the current time in one composition, deselect the Synchronize Time Of All Related Items preference (Edit > Preferences > General (Windows) or After Effects > Preferences > General (Mac OS)).

Online resources about precomposing and nesting

Chris and Trish Meyer share tips on setting up a composition hierarchy so that making changes in a project is easier in this article from the ProVideo Coalition website.

See this page on aescripts website for the Un-Precompose script, which extracts layers from a precomposition.

See this page on aescripts website for the Zorro-The Layer Tagger script, which allows you to group layers in your composition using tags rather than precomposing.

Precompose layers

Precomposing layers places them in a new composition (sometimes called a *precomposition*), which replaces the layers in the original composition. Precomposing a single layer is useful for adding transform properties to a layer and influencing the order in which elements of a composition are rendered.

1. Select the layers in the Timeline panel, and choose Layer > Pre-compose or press Ctrl+Shift+C (Windows) or Command+Shift+C (Mac OS).
2. Select one of the following:

   Leave All Attributes In Leaves the properties and keyframes of the precomposed layer in the original composition, applied to the new layer that represents the precomposition. The frame size of the new composition is the same as the size of the selected layer. This option is not available when you select more than one layer, a text layer, or a shape layer.

   Move All Attributes Into The New Composition Moves the properties and keyframes of the precomposed layers one level further from the root composition in the composition hierarchy. When you use this option, changes you applied to the properties of the layers remain with the individual layers within the precomposition. The frame size of the new composition is the same as the frame size of the original composition.

Effects can include masks and effects of other layers

Effects that use layers as an input such as - Set Matte and Displacement Map target the masks and effects of the input layer. You can use these layers without pre-composing them for the purpose of being referenced by an effect.

The control is similar to the function of View menu at the bottom of the Layer viewer panel which allows you to render the layer from different positions in the rendering order: from its source, from its masks, or from its individual effects. For effects with layer properties, open the Input Parameter menu to the right of the layer selection choose the target input layer such as:

- **Source:** targets only the source of the layer. Masks and effects are ignored.
- **Masks:** targets the layer after its masks are applied. Effects are ignored.
- **Effects & Masks**: targets the layer after its masks and effects are applied.

Opening and navigating nested compositions

Nested compositions are sometimes referred to as being *upstream* of the compositions that contain them, and the containing compositions are said to be *downstream* of the nested compositions that they contain. The *root composition* is the most downstream; the most deeply nested composition is the most upstream. A composition *flow path* is a chain of compositions that are related to one another by containing or being nested within one another. A *composition network* is the entire set of compositions that are related to one another through nesting.

After Effects provides several ways to open a nested composition (precomposition):

- Double-click the composition entry in the Project panel.
- Double-click a precomposition layer in the Timeline panel. Alt-double-click (Windows) or Option-double-click (Mac OS) to open the precomposition layer as a layer in the Layer panel.

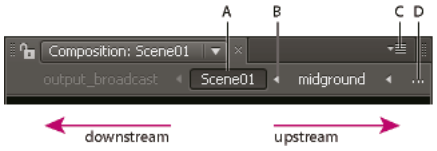
Note:

Double-clicking a precomposition layer when a paint tool or the Roto Brush tool is active opens the layer in the Layer panel.

- To open the most recently active composition in the same composition network as the currently active composition, press Shift+Esc.
- Use the Composition Navigator.
- Use the Composition Mini-Flowchart.

The Composition Navigator

The Composition Navigator is a bar along the top edge of the Composition panel that shows the composition active in that viewer in relation to other compositions in the same composition network. The compositions shown are the most recently active compositions in the flow path of the currently active composition.



***A** Active (current) composition **B** Arrow for opening Composition Mini-Flowchart **C** Panel menu button **D** Ellipsis*

Arrows between the composition names indicate the direction in which pixel information flows for this flow path. The default is to show compositions in the Composition Navigator bar with downstream compositions on the left and upstream compositions on the right. This default is indicated by the Flow Right To Left option in the Composition panel menu. To show compositions in the other order, choose Flow Left To Right. This setting is a global preference; it applies to all compositions and to the Composition Mini-Flowchart view.

The names of downstream compositions are dim to indicate that their contents are not used or shown in the active composition.

- To show or hide the Composition Navigator bar, choose Show Composition Navigator from the Composition panel menu.
- To activate any composition shown in the Composition Navigator bar, click the composition name.
- If the flow path is too long to show in the Composition panel, an ellipsis button appears at the left or right edge of the Composition Navigator bar. To temporarily show the entire flow path, click the ellipsis button.

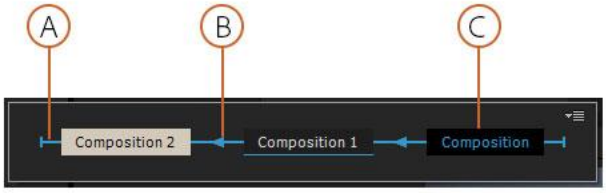
To scroll through a long flow path, place the pointer over a composition button in the Composition Navigator and roll the mouse scroll wheel.

The Composition Mini-Flowchart

The Composition Mini-Flowchart is a transient control that you can use to quickly navigate within a composition network. When you open the Composition Mini-Flowchart, it shows the compositions immediately upstream and downstream of the selected composition.

Colors in the Composition Mini-Flowchart are based on the label colors assigned to compositions in the Project panel. If a composition is used multiple times within one composition, the multiple instances of the nested composition appear as one entry with a number in parentheses indicating the number of instances.

To open the Composition Mini-Flowchart, do one of the following:



***A** Indicator that composition does not flow into other compositions **B** Direction of flow **C** Active (current) composition*

- Tap the Tab key when a Composition, Layer, or Timeline panel is active.
- Click the arrow to the right of a composition name in the Composition Navigator bar.
- Choose Composition Mini-Flowchart from the Composition menu, the Composition panel menu, or the Timeline panel menu.
- Click the Composition Mini-Flowchart button at the top of the Timeline panel.

As with the Composition Navigator, you can choose whether to show the flow direction from left to right or from right to left. Arrows indicate the direction of the flow. If a composition has a next to it instead of an arrow, then the composition either does not have any compositions flowing into it or it does not flow into any compositions.

Upstream compositions in the Composition Mini-Flowchart are sorted from top to bottom either alphabetically or by layer order. To switch between these sorting orders, press the S key when the Composition Mini-Flowchart is open. When sorting by layer order, a composition used multiple times is sorted according to its topmost instance in the stacking order. Downstream compositions are always sorted alphabetically.

To navigate among and select compositions in the Composition Mini-Flowchart, use the arrow keys or click the arrow or buttons on either side of a composition. To activate the selected composition, press the spacebar or Enter (Windows) or Return (Mac OS). To close the Composition Mini-Flowchart without taking any action, press Esc, tap Shift, or click outside the Composition Mini-Flowchart.

Rich Young provides additional information about the Flowchart panel and the Composition Mini-flowchart on the After Effects Portal website.

Pre-render a nested composition

A complex nested composition can take a long time to render, either for previews or for final output. If you have a nested composition that you do not expect to work on further, you can save time during each rendering operation by pre-rendering the nested composition into a movie and replacing the composition with the rendered movie. You can still modify the original nested composition, because it remains in the Project panel. If you make a significant change to the original nested composition, render it again.

Pre-rendering a nested composition is especially beneficial when you will use it multiple times in a project.

Note:

Apply your final output settings when you pre-render the nested composition.

1. Select the composition in the Project or Composition panel.
2. Choose Composition > Pre-render.

   The Pre-render command adds the composition to the render queue and sets the Import & Replace Usage post-render action to replace the composition with the rendered movie.
3. In the Render Queue panel, adjust settings as necessary, and click the Render button to render the composition.

Note:

An alternative to replacing the composition with the movie is to use the rendered movie as a proxy for the nested composition.

Render order and collapsing transformations

A composition consists of layers stacked on top of one another in the Timeline panel. When the composition is rendered—either for previewing or for final output—the bottom layer is rendered first. Within each raster (non-vector) layer, elements are applied in the following order: masks, effects, transformations, and layer styles. For continuously rasterized vector layers, the default rendering order is masks, followed by transformations, and then effects.

Transformations are changes to those properties grouped under the Transform category in the Timeline panel, including Anchor Point, Position, Scale, Rotation, and Opacity. What you see that in the Layer panel is the result of the rendering before transformations are performed.

Note:

For additional control over when transformations are performed, you can apply the Transform effect and reorder it with respect to other effects.

In a group of effects or masks, items are processed from top to bottom. For example, if you apply the Circle effect and then apply the Magnify effect, the circle is magnified. However, if you drag the Magnify effect above (before) the Circle effect in the Effect Controls or Timeline panel, the circle is drawn after the magnification and isn't magnified.

After a layer has been rendered, rendering begins for the next layer. The rendered layer below may be used as input to the rendering of the layer above—for example, for determining the result of a blending mode.

If a composition contains other compositions nested within it, the nested composition is rendered before other layers in the containing composition.

Note:

Some effects ignore masks on the layer to which they're applied. To have such an effect operate on a masked layer, pre-compose the layer with the mask applied, and then apply the effect to the pre-composed layer. (See About precomposing and nesting.)

Collapsing transformations

If the Collapse Transformations switch is selected for a nested composition, then the transformations for the nested composition are not performed until after the masks and effects for the containing composition are rendered. This render order allows the transformations for the nested composition and the containing composition to be combined—or *collapsed*—and performed together. The same is true for vector layers that are not continuously rasterized.

Note:

Instead of a Collapse Transformations switch, vector layers have a Continuously Rasterize switch in the same location. Vector layers include shape layers, text layers, and layers with vector graphic files as the source footage. Text layers and shape layers are always continuously rasterized.

Collapsing transformations can, for example, preserve resolution when a layer is scaled down by half in a nested composition, and the nested composition is scaled up by a factor of two in the containing composition. In this case, rather than performing both transformations and losing image data in the process, one transformation can be performed—doing nothing, because the individual transformations cancel each other.

If transformations are not collapsed, a nested composition that contains 3D layers is rendered as a 2D image of the 3D arrangement, using the default composition camera. This rendering prevents the nested composition from intersecting with 3D layers, casting shadows on 3D layers, and receiving shadows from 3D layers in the containing composition. The nested composition is also not controlled by the cameras and lights of the containing composition.

If transformations are collapsed, the 3D properties of the layers in the nested composition are exposed to the containing composition. Thus, the nested composition can intersect with 3D layers, cast shadows on 3D layers, and receive shadows from 3D layers in the containing composition. The containing composition's camera and lights can also control the nested composition.

Essentially, collapsing transformations for a nested composition tells After Effects to not flatten and crop the layers in the precomposition. Because an adjustment layer operates on the composite of all of the layers beneath it within the same composition, an adjustment layer within a nested composition with collapsed transformations will force the flattening and cropping that collapsing transformations would normally prevent.

When a closed mask (with mask mode other than None), a layer style, or an effect is applied to a nested composition with collapsed transformations, the layers in the nested composition are first rendered on their own, then masks and effects are applied, and then the result is composited into the main composition. This rendering order means that the blending modes of the nested layers are not applied to any underlying layers in the main composition, and that 3D layers above and below the collapsed layer cannot intersect or cast shadows on each other.

Online resources

Chris and Trish Meyer explain collapsing transformations and continuous rasterization in this article on the ProVideo Coalition website.

Timecode and time display units

Many quantities in After Effects are either points in time or spans of time, including the current time, layer In and Out points, and durations of layers, footage items, and compositions.

By default, After Effects displays time in Society of Motion Picture and Television Engineers (SMPTE) timecode: hours, minutes, seconds, and frames. You can change to another system of time display, such as frames, or feet and frames of 16mm or 35mm film.

You may want to see time values in Feet + Frames format, for example, if you are preparing a movie for eventual output to film; or in simple frame numbers if you plan to use your movie in an animation program such as Flash. The format you choose applies to the current project only.

Note:

Changing the time display format does not alter the frame rate of your assets or output—it changes only how frames are numbered for display in After Effects.

Video-editing workstations often use SMPTE timecode that is recorded onto videotape for reference. If you are creating video that will be synchronized with video that uses SMPTE timecode, use the default timecode display style.

In After Effects CS5.5 and later, timecode from source files can be displayed from a variety of file formats. Source timecode is found in several areas of the interface including the Project panel, Project Settings dialog box, Composition Settings dialog box and Preferences dialog box. See Source timecodefor more information.

Change time-display units

- To cycle through Timecode Base, or Frames/Feet + Frames (depending if you have the “Use Feet + Frames” option checked in the Project Settings), Ctrl-click (Windows) or Command-click (Mac OS) the current-time display. The current-time display is in the upper-left corner of the Timeline panel and at the bottom of the Layer, Composition, and Footage panels. (See Timeline panel.)

  The option that is not selected in Project Settings will be displayed as smaller text underneath. To display only the option selected in Project Settings (Timecode or Frames), do the following:

  1. Open Display preferences by selecting After Effects > Preferences > Display (Mac OS) or Edit > Preferences > Display (Windows).
  2. Deselect the Show Both Timecode and Frames in Timeline Panel option (this option is selected by default).

- To change time display units, choose File > Project Settings, and choose from the options in the Time Display Style section.

Options for time-display units

Timecode Displays time as timecode in the time rulers of the Timeline, Layer, and Footage panels, using either Use Media Source (source timecode) or starting at 00:00:00:00. Select the Timecode option to use timecode instead of Frames. Note that there are no options for choosing frame rate or drop-frame/non-drop-frame, as source timecode is detected and used instead.

Note:

You may have both drop-frame and non-drop-frame timecode in any composition within a project.

Frames Displays frame number instead of time. Use this setting for convenience when doing work that you are integrating with a frame-based application or format, like Flash or SWF. To use Frames, select Frames and deselect Feet + Frames.

Feet + Frames Displays the number of feet of film, plus frames for fractional feet, for 16mm or 35mm film. To use Feet + Frames, select Frames and select Feet + Frames.

Frame Count Determines the starting number for the time display style for Frames.

Timecode Conversion Timecode value of the item is used for the starting number (if the item has source timecode). If there is no timecode value, counting begins with zero. Timecode Conversion causes After Effects to behave as it has in previous versions, where the frame count and the timecode count of all assets are mathematically equivalent.

Start at 0 The counting for frames begins at zero.

Start at 1 The counting for frames begins at one.

Note:

The new options of "Start at 0" and "Start at 1" allow you to specify different frame-counting schemes between the "Frames" and "Timecode." For example, you might choose to honor the source timecode of footage items, but count frames beginning at zero or one.

Source timecode

Source timecode support file formats After Effects can read and use timecode for most formats including: QuickTime, DV, AVI, P2, MPEG-2, MPEG-4, H.264, AVCHD, RED, XDCAM EX, XDCAM HD, WAV, and DPX image sequence importers.

Project panel Source timecode is displayed in columns in the Project panel: Media Start, Media End, Media Duration, and Tape Name. These refer to the source's start, end, and total duration. There are columns for In, Out, and Duration, which reflect the In and Out points set by the user in the Footage panel for footage item, or the work area for compositions.

Project Settings The Project Settings dialog box contains the source timecode feature set. For details, see Options for time-display units.

Composition Settings dialog box The Composition Settings dialog box contains the source timecode feature set. For details, see Frame rate.

Preferences dialog box The Preferences dialog box's Import panel supports source timecode features. See Import preferences.

Online resources about timecode

Trish and Chris Meyer provide an article on the ProVideo Coalition website that describes the difference between drop-frame and non-drop-frame timecode.

Chris Pirazzi provides technical details about timecode on his Lurker's Guide to Video website.

Chapter 4: Importing footage

Importing and interpreting footage items

About imported files and footage items

You import source files into a project as the basis for *footage items* and use them as sources for *layers*. The same file can be the source for multiple footage items, each with its own interpretation settings. Each footage item can be used as the source for one or more layers. You work with collections of layers in a *composition*.

You primarily work with footage items in the Project panel. You can use the Footage panel to evaluate footage and perform simple editing tasks, such as trimming the duration of a footage item.

You can import many different kinds of files, collections of files, or components of files as sources for individual footage items, including moving image files, still-image files, still-image sequences, and audio files. You can even create footage items yourself within After Effects, such as solids and precompositions. You can import footage items into a project at any time.

When you import files, After Effects does not copy the image data itself into your project but creates a reference link to the source of the footage item, which keeps project files relatively small.

If you delete, rename, or move an imported source file, you break the reference link to that file. When a link is broken, the name of the source file appears in italics in the Project panel, and the File Path column lists it as missing. If the footage item is available, you can reestablish the link—usually just by double-clicking the item and selecting the file again.

You can find footage items for which the source items are missing by typing missing in the search field in the Project panel. See Search and filter in the Timeline, Project, and Effects & Presets panels.

To reduce rendering time and increase performance, it is often best to prepare footage before you import it into After Effects. For example, it is often better to scale or crop a still image in Photoshop before you bring it into After Effects, rather than scaling and cropping the image in After Effects. It is better to perform an operation once in Photoshop than to force After Effects to perform the same action many times per second—once for each frame in which the image appears.

To save time and minimize the size and complexity of a project, import a source item as a single footage item and then use it multiple times in a composition. It is occasionally useful, however, to duplicate a footage item and interpret each differently. For example, you can use the same footage at two different frame rates.

If you use another application to modify a footage item that is used in a project, the changes appear in After Effects the next time that you open the project or select the footage item and choose File > Reload Footage.

To replace the source footage item for a layer with another footage item, without affecting changes made to the layer properties, select the layer and then Alt-drag (Windows) or Option-drag (Mac OS) the new footage item onto the layer in the Timeline panel.

To replace all uses of selected footage items with another footage item, select footage items in the Project panel, and then Alt-drag (Windows) or Option-drag (Mac OS) the new footage item onto a selected footage item in the Project panel.

When After Effects imports video and audio in some formats, it processes and caches versions of these items that it can readily access when generating previews. This caching greatly improves performance for previews, because the video and audio items do not need to be reprocessed for each preview.

For more information about importing assets, see this video tutorial on the Creative COW website by Andrew Devis.

Native encoding and decoding of QuickTime files

After Effects can natively decode and encode QuickTime (.mov) files using the GoPro CineForm codecs on Mac OS and Windows. This means that you do not need to install additional codecs to use and create such files.

In MOV, After Effects has native import support for the following uncompressed formats:

- DV, IMX, MPEG2, XDCAM, h264, JPEG, Avid DNxHD, Avid DNxHR, Apple ProRes, AVCI, and GoPro CineForm

Native export support is available for the following uncompressed formats:

- Avid DNxHD, Avid DNxHR, DV, and GoPro CineForm

Note:

Because After Effects can natively import and export many codecs (listed above), QuickTime is not required on Windows. For more details about compatibility issues, read the blog post QuickTime on Windows

Supported import formats

Some filename extensions—such as MOV, AVI, MXF, FLV, and F4V—denote container file formats rather than denoting a specific audio, video, or image data format. Container files can contain data encoded using various compression and encoding schemes. After Effects can import these container files, but the ability to import the data that they contain is dependent on which codecs (specifically, decoders) are installed.

By installing additional codecs, you can extend the ability of After Effects to import additional file types. Many codecs must be installed into the operating system (Windows or Mac OS) and work as a component inside the QuickTime or Video for Windows formats. Contact the manufacturer of your hardware or software for more information about codecs that work with the files that your specific devices or applications create.

Importing and using some files requires the installation of additional import plug-ins. (See Plug-ins.)

Adobe Premiere Pro can capture and import many formats that After Effects can't import natively. You can bring data from Adobe Premiere Pro into After Effects in many ways. (See Working with Adobe Premiere Pro and After Effects.)

Audio formats

- Adobe Sound Document (ASND; multi-track files imported as merged single track)
- Advanced Audio Coding (AAC, M4A)
- Audio Interchange File Format (AIF, AIFF)
- MP3 (MP3, MPEG, MPG, MPA, MPE)

- Video for Windows (AVI; requires QuickTime on Mac OS)
- Waveform (WAV)

Still-image formats

- Adobe Illustrator (AI, AI4, AI5, EPS, PS; continuously rasterized)
- Adobe PDF (PDF; first page only; continuously rasterized)
- Adobe Photoshop (PSD)
- Bitmap (BMP, RLE, DIB)
- Camera Raw (TIF, CRW, NEF, RAF, ORF, MRW, DCR, MOS, RAW, PEF, SRF, DNG, X3F, CR2, ERF)
- Cineon/DPX (CIN, DPX with 8-, 10-, 12-, and 16-bpc DPX files, including those with an alpha channel and timecode)
- Discreet RLA/RPF (RLA, RPF; 16 bpc; imports camera data)
- EPS
- GIF
- JPEG (JPG, JPE)
- Maya camera data (MA)
- Maya IFF (IFF, TDI; 16 bpc)
- OpenEXR (EXR, SXR, MXR; 32 bpc)
- PICT (PCT)
- Portable Network Graphics (PNG; 16 bpc)
- Radiance (HDR, RGBE, XYZE; 32 bpc)
- SGI (SGI, BW, RGB; 16 bpc)
- Softimage (PIC)

Note:

3D Channel effect plug-ins from fnord software are included with After Effects to provide access to multiple layers and channels of OpenEXR files. (See .)

Note:

After Effects can also read ZPIC files corresponding to imported PIC files. See Importing and using 3D files from other applications.)

- Targa (TGA, VDA, ICB, VST)
- TIFF (TIF)

You can import files of any still-image format as a sequence. See Preparing and importing still images.

Video and animation formats

- Animated GIF (GIF)
- Avid DNxHR
- HEVC (H.265) MPEG-4

- Support for ARRIRAW files from the ARRI ALEXA, or ARRIFLEX D-21 cameras For more information on ARRIRAW files, see the ARRIRAW FAQ on the ARRI Group website.
- CinemaDNG

Note: CinemaDNG is a subset of Camera Raw. A subset of Camera Raw settings can be accessed via More Options in the Interpret Footage dialog box. Color management for CinemaDNG includes the same color spaces as After Effects existing Camera Raw: Adobe RGB, sRGB IEC619662.1, ColorMatch RGB, and ProPhoto RGB.

- DV (in MOV or AVI container, or as containerless DV stream)
- Electric Image (IMG, EI)
- FLV, F4V
- QuickTime (MOV; 16 bpc, only for codecs that do not have any native decoders)
- Video for Windows (AVI, WAV; requires QuickTime on Mac OS)
- Windows Media File (WMV, WMA, ASF; Windows only)
- XDCAM HD and XDCAM EX
- RED (R3D)
- Media eXchange Format (MXF)

MXF is a container format. After Effects can only import some kinds of data contained within MXF files. After Effects can import the Op-Atom variety of MXF files used by Panasonic video cameras to record to Panasonic P2 media. After Effects can import video from these MXF files using the AVC-Intra 50, AVC-Intra 100, DV, DVCPRO, DVCPRO50, and DVCPRO HD codecs. After Effects can also import XDCAM HD files in MXF format, the MXF OP1format, which contains MPEG-2 video that complies with the XDCAM HD format.

- MPEG-1, MPEG-2, and MPEG-4 formats: MPEG, MPE, MPG, M2V, MPA, MP2, M2A, MPV, M2P, M2T, M2TS (AVCHD), MP4, M4V, M4A
- SWF (continuously rasterized)

Project formats

- Adobe Premiere Pro 1.0, 1.5, 2.0, CS3, CS4, CS5, CS6, and CC (PRPROJ; 1.0, 1.5, and 2.0 Windows only), and later projects
- Adobe After Effects 6.0 and later binary projects in After Effects CS5 (AEP, AET)
- After Effects 7 can open projects from After Effects 3.0 through After Effects 7.
- Adobe After Effects CS4 and later XML projects (AEPX)

The Automatic Duck Pro Import AE plug-in is now bundled with the application, and called Pro Import After Effects. With it, you can import AAF and OMF files from an Avid system, XML files from Final Cut Pro 7, or earlier, and project files from Motion 4, or earlier. For more information on using Pro Import After Effects, see its User Guide, accessible by choosing File > Import > Pro Import After Effects, then clicking the Help button.

You can also import Final Cut Pro projects into Premiere Pro and then bring that project's components into After Effects.

Note:

- After Effects can also read EIZ files corresponding to imported EI files. See Importing and using 3D files from other applications.)

- Some MPEG data formats are stored in container formats with filename extensions that are not recognized by After Effects; examples include .vob and .mod. In some cases, you can import these files into After Effects after changing the filename extension to one of the recognized filename extensions. Because of variations in implementation in these container formats, compatibility is not guaranteed.
- For information about MPEG formats, see the MPEG website and the MPEG page on the Wikipedia website.
- Before working with QuickTime, read the alert issued by United States Computer Emergency Readiness Team in April 2016, which recommends Windows users uninstall Apple QuickTime from their computers.
- R3D files are interpreted as containing 32-bpc colors in a non-linear HDTV (Rec. 709) color space. The RED R3D Source Settings color adjustments don't preserve overbright values. Color adjustments done within After Effects do preserve overbright colors when you work in 32-bpc (bits per channel) color. To avoid clipping, manipulate exposure in After Effects, rather than in the footage interpretation stage in the RED R3D Source Settings dialog box.
- After Effects can import Sony XDCAM HD assets if they were recorded to MXF files. After Effects cannot import XDCAM HD assets in IMX format. After Effects can import Sony XDCAM EX assets stored as essence files with the .mp4 filename extension in a BPAV directory. For information about the XDCAM format, see this PDF document on the Sony website.
- SWF files are imported with an alpha channel. Audio is not retained. Interactive content and scripted animation are not retained. Animation defined by keyframes in the main, top-level movie is retained.

Import footage items

You can import media files into your project either by using the Import dialog box or by dragging. The imported footage items appear in the Project panel.

If the Interpret Footage dialog box appears after you import a footage item, it contains an unlabeled alpha channel, and you must select an alpha channel interpretation method or click Guess to let After Effects determine how to interpret the alpha channel. (See Alpha channel interpretation: premultiplied or straight.)

Import footage items using the Import dialog box

1 Choose File > Import > File, choose File > Import > Multiple Files, or double-click an empty area of the Project panel.

If you choose Import Multiple Files, then you can perform the next step more than once without needing to choose an Import command multiple times.

To display only supported footage files (excluding project files), choose All Footage Files from the Files Of Type (Windows) or Enable (Mac OS) menu.

2 Do one of the following:

- Select a file, and then click Open.
- Ctrl-click (Windows) or Command-click (Mac OS) multiple files to select them, and then click Open.
- Click a file and then Shift-click another file to select a range of files, and then click Open.
- (Windows only) Select an entire folder, and then click Import Folder.

Note:

If the Sequence option is selected, multiple files from the folder are imported as a sequence of still images.

Import footage items by dragging

If you always want the layered still-image files that you drag into After Effects to be imported as a composition, choose Edit > Preferences > Import (Windows) or After Effects > Preferences > Import (Mac OS), and choose Composition or Composition - Retain Layer Sizes from the Drag Import Multiple Items As menu. (See Import a still-image sequence as a composition.)

- To import a single file, drag it from Windows Explorer (Windows) or the Finder (Mac OS) into the Project panel.
- To import the contents of a folder as a sequence of still images that appear in the Project panel as a single footage item, drag a folder from Windows Explorer (Windows) or the Finder (Mac OS) into the Project panel.
- To import the contents of the folder as individual footage items that appear in the Project panel in a folder, Alt-drag a folder from Windows Explorer (Windows) or Option-drag a folder from the Finder (Mac OS) into the Project panel.
- To import a rendered output file from the Render Queue panel, drag the corresponding output module from the Render Queue panel into the Project panel.

Note:

If you drag an output module from the Render Queue panel into the Project panel before rendering, After Effects creates a placeholder footage item. References to the placeholder footage item are automatically replaced when the output module is rendered; the placeholder footage item itself is not replaced.

Interpret footage items

After Effects uses a set of internal rules to *interpret* each footage item that you import according to its best guess for the source file's pixel aspect ratio, frame rate, color profile, and alpha channel type. If After Effects guesses wrong, or if you want to use the footage differently, you can modify these rules for all footage items of a particular kind by editing the interpretation rules file (interpretation rules.txt), or you can modify the interpretation of a specific footage item using the Interpret Footage dialog box.

The interpretation settings tell After Effects the following about each footage item:

- How to interpret the interaction of the alpha channel with other channels (See Alpha channel interpretation: premultiplied or straight.)
- What frame rate to assume for the footage item (See Frame rate.)
- Whether to separate fields and, if so, what field order to assume (See Interlaced video and separating fields.)
- Whether to remove 3:2 or 24Pa pulldown (See Remove 3:2 or 24Pa pulldown from video.)
- The pixel aspect ratio of the footage item (See Pixel aspect ratio and frame aspect ratio.)
- The color profile of the footage item (See Interpret a footage item by assigning an input color profile.)

Note:

In all of these cases, the information is used to make decisions about how to interpret data in the imported footage item—to tell After Effects about the input footage. The interpretation settings in the Interpret Footage dialog box should match the settings used to create the source footage file. Do not use the interpretation settings to try to specify settings for your final rendered output.

Generally, you don't need to change interpretation settings. However, if a footage item isn't of a common kind, After Effects may need additional information from you to interpret it correctly.

You can use the controls in the Color Management section of the Interpret Footage dialog box to tell After Effects how to interpret the color information in a footage item. This step is usually only necessary when the footage item does not contain an embedded color profile.

When you preview in the Footage panel, you see the results of the footage interpretation operations.

Jeff Almasol provides a script on his redefinery website that you can use to make guessing the 3:2 pulldown, 24Pa pulldown, or alpha channel interpretation more convenient.

Note:

Select Preview in the Interpret Footage dialog box to preview the results of the settings made in this dialog box before you accept the changes.

Interpret a single footage item using the Interpret Footage dialog box

? Select a footage item in the Project panel and do one of the following:

- Click the Interpret Footage button at the bottom of the Project panel.
- Drag the footage item to the Interpret Footage button.
- Choose File > Interpret Footage > Main.
- Press Ctrl+Alt+G (Windows) or Command+Option+G (Mac OS).

Interpret a proxy using the Interpret Footage dialog box

? Select the original footage item in the Project panel and do one of the following:

- Alt-click (Windows) or Option-click (Mac OS) the Interpret Footage button at the bottom of the Project panel.
- Alt-drag (Windows) or Option-drag (Mac OS) the footage item to the Interpret Footage button.
- Choose File > Interpret Footage > Proxy.

Apply Interpret Footage settings to multiple footage items

You can ensure that different footage items use the same settings by copying interpretation settings from one item and applying them to others.

1. In the Project panel, select the item with the interpretation settings that you want to apply.
2. Choose File > Interpret Footage > Remember Interpretation.
3. Select one or more footage items in the Project panel.
4. Choose File > Interpret Footage > Apply Interpretation.

Edit interpretation rules for all items of a specific kind

The interpretation rules file contains the rules that specify how After Effects interprets footage items. In most cases, you don't need to customize the interpretation rules file. When you import a footage item, After Effects looks for a match in the interpretation rules file, and then determines interpretation settings for the footage item. You can override these settings after importing, using the Interpret Footage dialog box.

In most cases, the name of the interpretation rules file is interpretation rules.txt; however, some updates to After Effects install a new interpretation rules file with a name that indicates the updated version number, and the updated application uses this new file. If you've made changes to the old interpretation rules file, you may need to apply those changes to the new file, too.

Locations of the interpretation rules file in After Effects:

- (Windows) <drive>\Users\<username>\AppData\Roaming\Adobe\After Effects <15.1>
- (Mac OS) <drive>/Users/<username>/Library/Preferences/Adobe/After Effects <15.1>

Locations of the interpretation rules file in previous versions of After Effects:

- (Windows) <drive>\Users\<username>\AppData\Roaming\Adobe\After Effects <14.x>
- (Mac OS) <drive>/Users/<username>/Library/Preferences/Adobe/After Effects <14.x>

1. Quit After Effects.
2. As a precaution, make a backup copy of the interpretation rules file. By default, this file is in the same location as the After Effects application.
3. Open the interpretation rules file in a text editor.
4. Modify the settings according to the instructions in the file.

   Note:

   You must supply a four-character file-type code for each footage type or codec. If you don't know the code for a file or codec in a project, press Alt (Windows) or Option (Mac OS) as you select the file in the Project panel. The file-type code and codec code (if the file is compressed) appear in the last line of the file description at the top of the Project panel.
5. Save interpretation rules.txt.

Alpha channel interpretation: premultiplied or straight

Image files with alpha channels store transparency information in one of two ways: straight or premultiplied. Although the alpha channels are the same, the color channels differ.

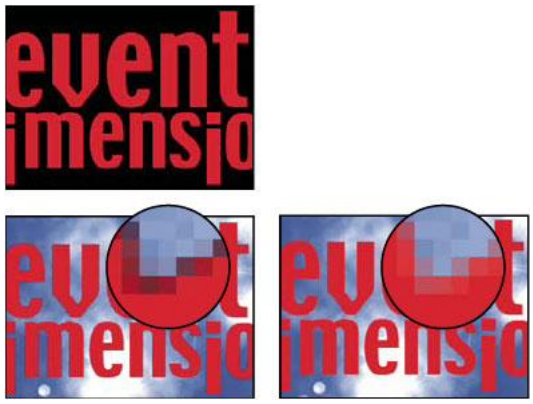
With straight (or unmatted) channels, transparency information is stored only in the alpha channel, not in any of the visible color channels. With straight channels, the results of transparency aren't visible until the image is displayed in an application that supports straight channels.

With premultiplied (or matted) channels, transparency information is stored in the alpha channel and also in the visible RGB channels, which are multiplied with a background color. Premultiplied channels are sometimes said to be matted with color. The colors of semitransparent areas, such as feathered edges, are shifted toward the background color in proportion to their degree of transparency.

Some software lets you specify the background color with which the channels are premultiplied; otherwise, the background color is usually black or white.

Straight channels retain more accurate color information than premultiplied channels. Premultiplied channels are compatible with a wider range of programs, such as Apple QuickTime Player. Often, the choice of whether to use images with straight or premultiplied channels has been made before you receive the assets to edit and composite. Adobe Premiere Pro and After Effects recognize both straight and premultiplied channels, but only the first alpha channel they encounter in a file containing multiple alpha channels.

Setting the alpha channel interpretation correctly can prevent problems when you import a file, such as undesirable colors at the edge of an image or a loss of image quality at the edges of the alpha channel. For example, if channels are interpreted as straight when they are actually premultiplied, semitransparent areas retain some of the background color. If a color inaccuracy, such as a halo, appears along the semitransparent edges in a composition, try changing the interpretation method.



A footage item with premultiplied channels (top) appears with a black halo when interpreted as Straight-Unmatted (lower-left). When the footage item is interpreted as Premultiplied-Matted With Color and the background color is specified as black, the halo does not appear (lower-right).

You can use the Remove Color Matting effect to remove the fringes from the semi-transparent areas of a layer by unmultiplying it.

Set the alpha channel interpretation for a footage item

1. In the Project panel, select a footage item.
2. Choose File > Interpret Footage > Main.
3. If you want to switch the opaque and transparent areas of the image, select Invert Alpha.
4. In the Alpha section, select an interpretation method:

   Guess Attempts to determine the type of channels used in the image. If After Effects cannot guess confidently, it beeps.

   Ignore Disregards transparency information contained in the alpha channel.

   Straight - Unmatted Interprets the channels as straight.

   Premultiplied - Matted With Color Interprets channels as premultiplied. Use the eyedropper or color picker to specify the color of the background with which the channels were premultiplied.

Set the default alpha channel preferences

1. Choose Edit > Preferences > Import (Windows) or After Effects > Preferences > Import (Mac OS).
2. Choose options from the Interpret Unlabeled Alpha As menu. The options in this menu are similar to the options in the Interpret Footage dialog box. Ask User specifies that the Interpret Footage dialog box opens each time a footage item with an unlabeled alpha channel is imported.

Frame rate

The composition frame rate determines the number of frames displayed per second, and how time is divided into frames in the time ruler and time display. In other words, the composition frame rate specifies how many times per second images are sampled from the source footage items, and it specifies the time divisions at which keyframes can be set.

Note:

After Effects contains a menu for drop-frame or non-drop-frame timecode in the Composition Settings dialog box. In previous releases, this option was a global setting per project.

Composition frame rate is usually determined by the type of output that you are targeting. NTSC video has a frame rate of 29.97 frames per second (fps), PAL video has a frame rate of 25 fps, and motion picture film typically has a frame rate of 24 fps. Depending on the broadcast system, DVD video can have the same frame rate as NTSC video or PAL video, or a frame rate of 23.976. Cartoons and video intended for CD-ROM or the web are often 10–15 fps.

Setting the composition frame rate to twice the rate of the output format causes After Effects to display each field of interlaced source footage as its own, separate frame in the Composition panel. This process lets you set keyframes on individual fields and gain precision when animating masks.

When you render a movie for final output, you can choose to use the composition frame rate or another frame rate. The ability to set the frame rate for each output module is useful when you are using the same composition to create output for multiple media.

Support for high-frame-rate footage

You can set any frame rate field up to a maximum of 999 fps in the April 2017 release of After Effects. The update lets you use higher frame rates for rendering, unlike the earlier versions where the maximum frame rate you could set for a composition was 99 fps.

Each motion-footage item in a composition can also have its own frame rate. The relationship between the footage-item frame rate and the composition frame rate determines how smoothly the layer plays. For example, if the footage-item frame rate is 30 fps and the composition frame rate is 30 fps, then whenever the composition advances one frame, the next frame from the footage item is displayed. If the footage-item frame rate is 15 fps and the composition frame rate is 30 fps, then each frame of the footage item appears in two successive frames of the composition. (This assumes, of course, the simple case in which no time stretching or frame blending has been applied to the layer.)

Ideally, use source footage that matches the final output frame rate. This way, After Effects renders each frame, and the final output does not omit, duplicate, or interpolate frames. If, however, the source footage has a frame rate slightly different from what you want to output to (for example, 30-fps footage and 29.97-fps final output), you can make the footage frame rate match the composition frame rate by conforming it.

Conforming the frame rate of a footage item does not alter the original file, only the reference that After Effects uses. When conforming, After Effects changes the internal duration of frames but not the frame content. Afterward, the footage plays back at a different speed. For example, if you conform the frame rate from 15 fps to 30 fps, the footage plays back twice as fast. In most cases, conform the frame rate only when the difference between the footage frame rate and the output frame rate is small.

Note:

Conforming can change the synchronization of visual footage that has an audio track, because changing the frame rate changes the duration of the video but leaves the audio unchanged. If you want to stretch both audio and video, use the Time Stretch command. (See Time-stretch a layer.) Keyframes applied to the source footage remain at their original locations (which retains their synchronization within the composition but not the visual content of the layer). You may need to adjust keyframe locations after conforming a footage item.

You can change the frame rate for any movie or sequence of still images. For example, you can import a sequence of ten still images and specify a frame rate for that footage item of 5 frames per second (fps); this sequence would then have a duration of two seconds when used in a composition.

Note:

When you import a sequence of still images, it assumes the frame rate specified by the Sequence Footage preference in the Import category. The default rate is 30 frames per second (fps). You can change the frame rate after importing by reinterpreting the footage item. (See Interpret footage items.)

Lower frame rates tend to give the impression of unreality, so many people prefer to work at a lower frame rate such as 24 frames per second for creative work instead of working at the 29.97 frames per second that is standard for NTSC video.

Note:

If you remove 3:2 pulldown from interlaced video footage, After Effects automatically sets the frame rate of the resulting footage item to four-fifths of the original frame rate. When removing 3:2 pulldown from NTSC video, the resulting frame rate is 24 fps.

The frame rate of the composition should match the frame rate of the final output format. In most cases, you can simply choose a composition settings preset. In contrast, set the frame rate for each footage item to the frame rate of the original source footage.

Trish and Chris Meyer provide tips and tricks regarding conforming footage items to a specific frame rate in an article (PDF) on Artbeats website.

Change frame rate for a footage item

1. Select the footage item in the Project panel.
2. Choose File > Interpret Footage > Main.
3. Select Conform To Frame Rate, enter a new frame rate for Frames Per Second, and then click OK.

Instead of using Interpret Footage to change a footage item's frame rate, you can time-stretch a layer based on the footage item. For example, time-stretch a layer by 100.1% to convert between 30fps and 29.97fps. Time-stretching modifies the speed of audio as well as video. (See Time-stretch a layer.)

Change frame rate for a composition

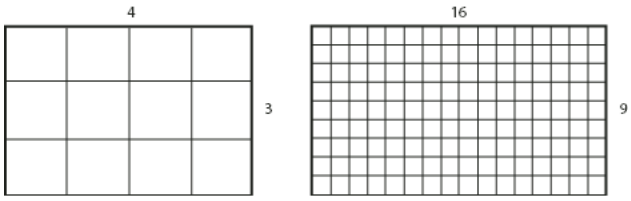
1. Choose Composition > Composition Settings.
2. Do one of the following:
   - Choose a composition settings preset from the Preset menu.
   - Set the Frame Rate value.

Note:

Jeff Almasol provides a script on is redefinery website to set the frame rate and duration of the current composition and all compositions nested within it.

Pixel aspect ratio and frame aspect ratio

Pixel aspect ratio (*PAR*) is the ratio of width to height of one pixel in an image. *Frame aspect ratio* (sometimes called *image aspect ratio* or *IAR*) is the ratio of width to height of the image frame.



A 4:3 frame aspect ratio (left), and a wider 16:9 frame aspect ratio (right)

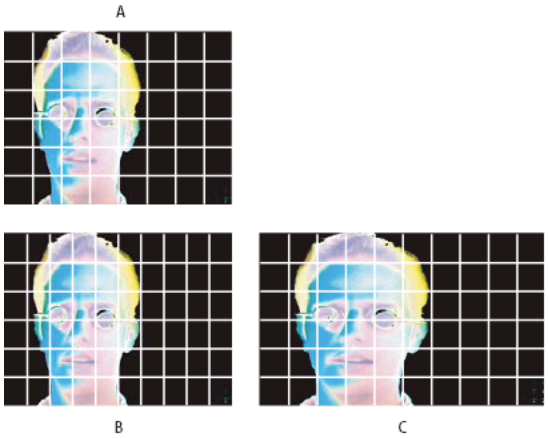
Most computer monitors use square pixels, but many video formats—including ITU-R 601 (D1) and DV—use non-square rectangular pixels.

Some video formats output the same frame aspect ratio but use a different pixel aspect ratio. For example, some NTSC digitizers produce a 4:3 frame aspect ratio, with square pixels (1.0 pixel aspect ratio), and a frame with pixel dimensions of 640x480. D1 NTSC produces the same 4:3 frame aspect ratio but uses nonsquare pixels (0.91 pixel aspect ratio) and a frame with pixel dimensions of 720x486. D1 pixels, which are always nonsquare, are vertically oriented in systems producing NTSC video and horizontally oriented in systems producing PAL video.

If you display nonsquare pixels on a square-pixel monitor without alteration, images and motion appear distorted; for example, circles distort into ellipses. However, when displayed on a video monitor, the images are correct. When you import D1 NTSC or DV source footage into After Effects, the image looks slightly wider than it does on a D1 or DV system. (D1 PAL footage looks slightly narrower.) The opposite occurs when you import anamorphic footage using D1/DV NTSC Widescreen or D1/DV PAL Widescreen. Widescreen video formats have a frame aspect ratio of 16:9.

Note:

To preview non-square pixels on a computer monitor, click the Toggle Pixel Aspect Ratio Correction button at the bottom of the Composition panel. The quality of the pixel aspect ratio correction for previews is affected by the Zoom Quality preference in the Previews category. (See Viewer Quality preferences.)



Square and nonsquare pixels
***A** Square pixels and 4:3 frame aspect ratio **B** Nonsquare pixels and 4:3 frame aspect ratio **C** Nonsquare pixels displayed on a square-pixel monitor*

If a footage item uses nonsquare pixels, After Effects displays the pixel aspect ratio next to the thumbnail image for the footage item in the Project panel. You can change the pixel aspect ratio interpretation for individual footage items in the Interpret Footage dialog box. By ensuring that all footage items are interpreted correctly, you can combine footage items with different pixel aspect ratios in the same composition.

After Effects reads and writes pixel aspect ratios directly from QuickTime movies. For example, if you import a movie captured as widescreen (16:9 DV), After Effects automatically tags it correctly. Similarly, AVI and PSD files contain information that explicitly indicates the pixel aspect ratio of the images.

If a footage item does not contain information that explicitly indicates the pixel aspect ratio of the image, After Effects uses the pixel dimensions of the footage item frame to make a guess. When you import a footage item with either the D1 pixel dimensions of 720x486 or the DV pixel dimensions of 720x480, After Effects automatically interprets that footage item as D1/DV NTSC. When you import a footage item with the D1 or DV pixel dimensions of 720x576, After Effects automatically interprets that footage item as D1/DV PAL. However, you can make sure that all files are interpreted correctly by looking in the Project panel or the Interpret Footage dialog box.

Note:

Make sure to reset the pixel aspect ratio to Square Pixels when you import a square-pixel file that happens to have a D1 or DV pixel dimensions—for example, a non-DV image that happens to have pixel dimensions of 720x480.

The pixel aspect ratio setting of the composition should match the pixel aspect ratio of the final output format. In most cases, you can simply choose a composition settings preset. In contrast, set the pixel aspect ratio for each footage item to the pixel aspect ratio of the original source footage.

Trish and Chris Meyer provide tips and tricks regarding pixel aspect ratio in two PDF documents on the Artbeats website:

- Pixel aspect ratio, part 1
- Pixel aspect ratio, part 2

Chris Pirazzi provides technical details about aspect ratios on his Lurker's Guide to Video website.

Upgrade pixel aspect ratios to correct values

After Effects CS3 and earlier used pixel aspect ratios for standard-definition video formats that ignore the concept of *clean aperture*. By not accounting for the fact that clean aperture differs from *production aperture* in standard-definition video, the pixel aspect ratios used by After Effects CS3 and earlier were slightly inaccurate. The incorrect pixel aspect ratios cause some images to appear subtly distorted.

Note:

The clean aperture is the portion of the image that is free from artifacts and distortions that appear at the edges of an image. The production aperture is the entire image.

Todd Kopriva summarizes information about the corrected pixel aspect ratios in a post on the Adobe website.

The following table provides details about pixel aspect ratio values in After Effects:

format	value in After Effects CS4 and later	previous value
D1/DV NTSC	0.91	0.9
D1/DV NTSC Widescreen	1.21	1.2
D1/DV PAL	1.09	1.07
D1/DV PAL Widescreen	1.46	1.42

This discrepancy is limited to these older, standard-definition formats for which clean aperture differs from production aperture. This discrepancy doesn't exist in newer formats.

New projects and compositions created in After Effects CS4 and later use the correct pixel aspect ratio values by default.

Projects and compositions created in After Effects CS3 or earlier are upgraded to use the correct pixel aspect ratios when these projects are opened in After Effects CS4 and later.

Note:

If you have a custom interpretation rules file, then you should update it with the correct pixel aspect ratio values.

If you use square-pixel footage items that are designed to fill the frame in a composition with non-square pixels, you may find that the change in pixel aspect ratios causes a difference in behavior. For example, if you previously created 768x576 square-pixel footage items to use in a PAL D1/DV composition, you should now create those items with square-pixel dimensions of 788x576.

Composition settings presets for square-pixel equivalents of standard definition formats have changed as follows:

format	pixel dimensions in After Effects CS4 and later	previous pixel dimensions
NTSC D1 square-pixel equivalent	720x534	720x540
NTSC D1 Widescreen square-pixel equivalent	872x486	864x486
PAL D1/DV square-pixel equivalent	788x576	768x576
PAL D1/DV Widescreen square-pixel equivalent	1050x576	1024x576

Change pixel aspect ratio interpretation for a footage item

1. Select a footage item in the Project panel.
2. Choose File > Interpret Footage > Main.
3. Choose a ratio from the Pixel Aspect Ratio menu and click OK.

Change pixel aspect ratio for a composition

1. Choose Composition > Composition Settings.
2. Do one of the following:
   - Choose a composition settings preset from the Preset menu.
   - Choose a value from the Pixel Aspect Ratio menu.

Common pixel aspect ratios

	Pixel aspect ratio	When to use
Square pixels	1.0	Footage has a 640x480 or 648x486 frame size, is 1920x1080 HD (not HDV or DVCPRO HD), is 1280x720 HD or HDV, or was exported from an application that doesn't support nonsquare pixels. This setting can also be appropriate for footage that was transferred from film or for customized projects.
D1/DV NTSC	0.91	Footage has a 720x486 or 720x480 frame size, and the desired result is a 4:3 frame aspect ratio. This setting can also be appropriate for footage that was exported from an application that works with nonsquare pixels, such as a 3D animation application.
D1/DV NTSC Widescreen	1.21	Footage has a 720x486 or 720x480 frame size, and the desired result is a 16:9 frame aspect ratio.
D1/DV PAL	1.09	Footage has a 720x576 frame size, and the desired result is a 4:3 frame aspect ratio.
D1/DV PAL Widescreen	1.46	Footage has a 720x576 frame size, and the desired result is a 16:9 frame aspect ratio.
Anamorphic 2:1	2.0	Footage was shot using an anamorphic film lens, or it was anamorphically transferred from a film frame with a 2:1 aspect ratio.
HDV 1080/DVCPRO HD 720, HD Anamorphic 1080	1.33	Footage has a 1440x1080 or 960x720 frame size, and the desired result is a 16:9 frame aspect ratio.
DVCPRO HD 1080	1.5	Footage has a 1280x1080 frame size, and the desired result is a 16:9 frame aspect ratio.

Importing and interpreting video and audio

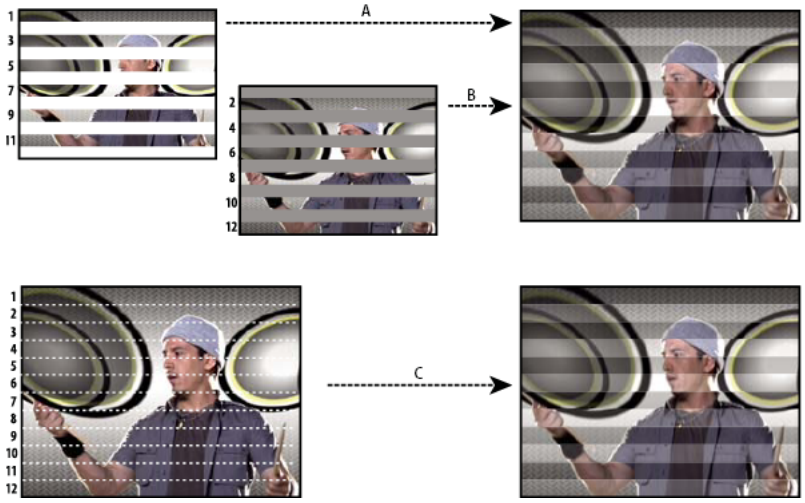
Interlaced video and separating fields

Interlacing is a technique developed for transmitting television signals using limited bandwidth. In an interlaced system, only half the number of horizontal lines for each frame of video are transmitted at a time. Because of the speed of transmission, the afterglow of displays, and the persistence of vision, the viewer perceives each frame in full resolution. All of the analog television standards use interlacing. Digital television standards include both *interlaced* and *noninterlaced* varieties. Typically, interlaced signals are generated from interlaced scanning, whereas noninterlaced signals are generated from *progressive scanning*.

Each interlaced video frame consists of two *fields*. Each field contains half the number of horizontal lines in the frame; the *upper field* (or *Field 1*) contains the odd-numbered lines, and the *lower field* (or *Field 2*) contains the even-numbered lines. An interlaced video monitor displays each frame by first drawing all of the lines in one field and then drawing all of the lines in the other field. *Field order* specifies which field is drawn first. In NTSC video, new fields are drawn to the screen approximately 60 times per second, corresponding to a frame rate of approximately 30 frames per second.

Noninterlaced video frames aren't separated into fields. A *progressive-scan* monitor displays a noninterlaced video frame by drawing all the horizontal lines, from top to bottom, in one pass. Computer monitors are almost all progressive-scan monitors, and most video displayed on computer monitors is noninterlaced.

The terms *progressive* and *noninterlaced* are thus closely related and are often used interchangeably, but *progressive scanning* refers to the recording or drawing of the scan lines by a camera or monitor, whereas *noninterlaced* refers to the fact that the video data itself isn't separated into fields.



Interlaced scanning of interlaced video fields compared with progressive scanning of noninterlaced video frame.
***A** For interlaced video, entire upper field (odd-numbered lines) is drawn to screen first, from top to bottom, in one pass. **B** Next, entire lower field (even-numbered lines) is drawn to screen, from top to bottom, in one pass. **C** For noninterlaced video, entire frame (all lines in counting order) is drawn to screen, from top to bottom, in one pass.*

Separate video fields

If you want to use interlaced or field-rendered footage (such as NTSC video) in an After Effects project, you get the best results if you separate the video fields when you import the footage. After Effects separates video fields by creating a full frame from each field, preserving all of the image data from the original footage.

Separating fields is critical if you plan to make significant changes to the image. When you scale, rotate, or apply effects to interlaced video, unwanted artifacts, such as crossed fields, are often introduced. By separating fields, After Effects accurately converts the two interlaced frames in the video to noninterlaced frames, while preserving the maximum amount of image quality. Using noninterlaced frames allows After Effects to apply edits and effects consistently and at the highest quality.

After Effects creates field-separated footage from a single formerly interlaced frame by splitting it into two independent frames. Each new frame has only half the information of the original frame, so some frames may appear to have a lower resolution than others when viewed at Draft quality. When you render the final composition, After Effects reproduces high-quality interlaced frames for output. When you render a movie at Best quality, After Effects interpolates between the scan lines of a field to produce maximum image quality.

If your output will not be interlaced, it's best to use noninterlaced source footage, to avoid the need to separate fields. However, if a noninterlaced version of your source footage is not available, interlaced footage will work fine.

Always separate fields for interlaced footage. Never separate fields for noninterlaced footage items.

You can only remove pull-down after you have separated fields.

When you render a composition containing field-separated footage, set the Field Rendering option to the same field order as your video equipment. If you don't field-render the composition, or if you field-render with the incorrect settings, the final movie may appear too soft, jerky, or distorted.

To quickly give video footage a more film-like appearance, import the footage twice, and interpret each footage item with a different field order. Then add them both to the same composition and blend them together. The misinterpreted layer adds some film-like blur.

After Effects automatically separates fields for D1 and DV video footage items. You can manually separate fields for all other types of video footage in the Interpret Footage dialog box.

1. Select the footage item in the Project panel.
2. Choose File > Interpret Footage > Main.
3. Choose an option from the Separate Fields menu.
4. Click Preserve Edges (Best Quality Only) to increase image quality in nonmoving areas when the image is rendered at Best quality. Then click OK.

Note:

If the field settings in the Interpret Footage dialog box are correct for the input footage and the field settings in the Render Settings dialog box are correct for the output device, you can mix footage items of different field orders in a composition. If either of these settings is incorrect, however, the frames will be in the correct order, but the field order may be reversed, resulting in jerky, unacceptable images.

Determine the original field order

The *field order* for an interlaced video footage item determines the order in which the two video fields (upper and lower) are displayed. A system that draws the upper lines before the lower lines is called *upper-field first*; one that draws the lower lines before the upper lines is called *lower-field first*. Many standard-definition formats (such as DV NTSC) are lower-field first, whereas many high-definition formats (such as 1080i DVCPRO HD) are upper-field first.

The order in which the fields are displayed is important, especially when the fields contain motion. If you separate video fields using the wrong field order, motion does not appear smooth.

Some programs, including After Effects, label the field order when rendering interlaced video files. When you import a labeled video file, After Effects honors the field order label automatically. You can override this field order by applying different footage interpretation settings.

If a file does not contain a field order label, you can match the original field order of your footage. If you are not sure which field order was used to interlace a footage item, use this procedure to find out.

1. Select the item in the Project panel.
2. Choose File > Interpret Footage > Main.
3. In the Interpret Footage dialog box, select Upper Field First from the Separate Fields menu, and then click OK.
4. In the Project panel, press Alt (Windows) or Option (Mac OS) as you double-click the footage to open it in the Footage panel.
5. If the Preview panel is not visible, choose Window > Preview.
6. In the Footage panel, find a segment that contains one or more moving areas.

7 Using the Next Frame button in the Preview panel, step forward at least five frames in the Footage panel. Moving areas should move consistently in one direction. If the moving areas move backward every other frame, the wrong field-separation option has been applied to the footage.

Online resources about fields and interlaced video

Chris Pirazzi provides technical details of fields and interlacing on his Lurker's Guide to Video website.

Trish and Chris Meyer provide a variety of materials about interlacing, field order, field dominance, field rendering, and separating fields:

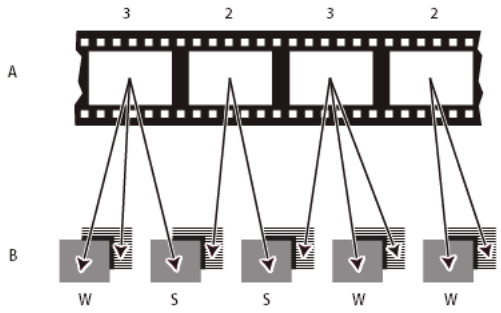
- article introducing interlacing and field order on the ProVideo Coalition website

Remove 3:2 or 24Pa pulldown from video

When you transfer 24-fps film to 29.97-fps video, you use a process called *3:2 pulldown*, in which the film frames are distributed across video fields in a repeating 3:2 pattern. The first frame of film is copied to fields 1 and 2 of the first frame of video, and also to field 1 of the second video frame. The second frame of film is then spread across the next two fields of video—field 2 of the second video frame and field 1 of the third frame of video. This 3:2 pattern is repeated until four frames of film are spread over five frames of video, and then the pattern is repeated.

The 3:2 pulldown process results in *whole frames* (represented by a W) and *split-field* frames (represented by an S). The three whole video frames contain two fields from the same film frame. The remaining two split-field frames contain a video frame from two different film frames. The two split-field frames are always adjacent to each other. The *phase* of 3:2 pulldown refers to the point at which the two split-field frames fall within the first five frames of the footage.

Phase occurs as a result of two conversions that happen during 3:2 pulldown: 24-fps film is redistributed through 30-fps video, so each of four frames of 24-fps film is spread out over five frames of 30(29.97)-fps video. First, the film is slowed down 0.1% to match the speed difference between 29.97 fps and 30 fps. Next, each film frame is repeated in a special pattern and mated to fields of video.



When you apply 3:2 pulldown to footage, one frame of the film (A) is separated into two or three interlaced video fields (B) which are grouped into video frames containing two fields each.

When importing interlaced video that was originally transferred from film, you can remove the 3:2 pulldown that was applied during the transfer from film to video as you separate fields so that effects you apply in After Effects don't appear distorted.

It's important to remove 3:2 pulldown from video footage that was originally film so that effects you add in After Effects synchronize perfectly with the original frame rate of film. Removing 3:2 pulldown reduces the frame rate by 1/5—from 30 to 24 fps or from 29.97 to 23.976 fps, which also reduces the number of frames you have to change. To remove 3:2 pulldown, you must also indicate the phase of the 3:2 pulldown.

After Effects also supports Panasonic DVX100 24p DV camera pulldown, called *24P Advance (24Pa)*. Some cameras use this format to capture 23.976 progressive-scan imagery using standard DV tapes.

Before you remove 3:2 pulldown, separate the fields as either upper-field first or lower-field first. Once the fields are separated, After Effects can analyze the footage and determine the correct 3:2 pulldown phase and field order. If you already know the phase and field order, choose them from the Separate Fields and the Remove menus in the Interpret Footage dialog box.

1. In the Project panel, select the footage item from which to remove 3:2 pulldown.
2. Choose File > Interpret Footage > Main.
3. In the Fields and Pulldown section, select Upper Field First or Lower Field First from the Separate Fields menu.
4. Do one of the following and click OK:
   - If you know the phase of the 3:2 or 24Pa pulldown, choose it from the Remove menu.
   - To have After Effects determine the correct settings, click Guess 3:2 Pulldown or Guess 24Pa Pulldown.

   Note:

   If your footage file contains frames from different sources, the phase may not be consistent. If the phase is inconsistent, import the footage multiple times, once for each phase, and interpret each footage item with a different setting. Then, add each footage item to your composition and trim each layer to use only the appropriate frames. In other words, if you have an asset that has multiple pulldown phases, then you need to cut that asset into pieces and remove pulldown separately for each of the pieces. This can come up if the asset is a movie that has been edited together from several sources in an NLE.

Import assets in Panasonic P2 format

A P2 card is a solid-state memory device that plugs into the PCMCIA slot of a Panasonic P2 video camera. The digital video and audio data from the video camera is recorded onto the card in a structured, codec-independent format known as *MXF (Media eXchange Format)*. Specifically, Adobe Premiere Pro and After Effects support the Panasonic Op-Atom variant of MXF, with video in AVC-Intra 50, AVC-Intra 100, DV, DVCPRO, DVCPRO50, and DVCPRO HD formats. A clip is said to be in the *P2 format* if its audio and video are contained in Panasonic Op-Atom MXF files, and these files are located in a specific folder structure.

The root of the P2 folder structure is a CONTENTS folder. Each *essence* item (an item of video or audio) is contained in a separate MXF wrapper file; the video MXF files are in the VIDEO subfolder, and the audio MXF files are in the AUDIO subfolder. The relationships between essence files and the metadata associated with them are tracked by XML files in the CLIP subfolder.

Note:

Adobe Premiere Pro and After Effects do not support proxies recorded by Panasonic P2 camcorders in P2 card PROXY folders.

The video and audio on a P2 card are already in a digital form, as if the P2 card were a hard disk, so no capture step is involved in importing media from a P2 card. The process of reading the data from the card and converting it to a format that can be used in a project is sometimes referred to as ingest.

For your computer to read P2 cards, you must install the appropriate driver, which you can download from the Panasonic website. Panasonic also provides the P2 Viewer application, with which you can browse and play media stored on a P2 card.

Because Panasonic P2 cards use the FAT32 file system, each file is limited to a size of 4 GB. When a shot is recorded that requires more than the 4 GB, a P2 camera creates another file and continues recording the shot to the new file without interruption. This is referred to as clip spanning, because the shot spans more than one file or clip. Similarly, a camera may span a shot across files on different P2 cards: if the camera has more than one P2 card loaded, it will record the shot until it runs out of room on the first P2 card, create a new file on the next P2 card with available space, and continue recording the shot to it. Although a single shot can be recorded to a group of multiple spanned clips, the multiple-file shot is designed to be treated as a single clip or footage item in a video editing application. For After Effects to automatically import a group of spanned clips simultaneously and assemble them into a single footage item, they must all have been recorded to the same P2 card and none of the files can be missing, including the associated XML metadata file.

1 (Optional) Copy the entire contents of the P2 card to a hard disk.

   Though it is possible to import assets into Adobe Premiere Pro or After Effects directly from a P2 card, it is usually more efficient to copy the contents of the P2 card to a hard disk before importing.

2 Choose File > Import.

3 Navigate to the CONTENTS folder.

4 Select one or more MXF files:

   - To import a video essence item and its associated audio essence items, select the MXF files from the VIDEO folder.
   - To import only the audio essence items, select the MXF files from the AUDIO folder.
   - To import a group of spanned clips for a shot that were recorded onto the same P2 card, select only one of the MXF files in the group from the VIDEO folder. The group is imported as a single footage item with a duration equal to the total duration of all the spanned clips it includes. If you select more than one of these spanned clips, you import duplicates of the whole group of spanned clips, as duplicate footage items in the Project panel.

   You cannot import spanned clips from a shot that spans two different cards as a single footage item. Rather, you must select a single MXF file belonging to the shot from each card to create a separate footage item for the part of the shot recorded on each card. For example, if a group of spanned clips for a single shot itself spans two cards, you must select a spanned clip from the group on card 1 and another from the group on card 2. This imports the contents of the shot into two footage items in the Project panel.

The Date column in the Project panel shows when each source clip was acquired. After you import spanned clips, you can use the Date value to determine their correct chronological order within the shot.

Note:

After Effects can't directly export to the P2 format. To render and export to the P2 format, use Adobe Media Encoder or Premiere Pro.

For additional information on the Panasonic P2 format and workflows with Adobe digital video software, see the Adobe website:

- Adobe workflow guides for P2, RED, XDCAM, AVCCAM, and DSLR cameras and footage
- P2 workflow guide for Adobe digital video products
- Dave Helmly's video introduction to the P2 workflow in After Effects

Preparing and importing 3D image files

Importing 3D images from Photoshop and Illustrator

3D object layers in PSD files

Adobe Photoshop can import and manipulate 3D models (3D objects) in several popular formats. Photoshop can also create 3D objects in basic, primitive shapes.

After Effects cannot import 3D objects from PSD files.

See working with 3d layers video on the learn tutorials page.

Vanishing Point exchange

When you use the Vanishing Point feature in Photoshop Extended, you can then use the File > Export For After Effects (*.vpe*) command to save the results as a collection of PNG files—one for each plane—and a *.vpe* file that describes the geometry of the scene. You can then import the *.vpe* file into After Effects. After Effects uses the information in the *.vpe* file to re-create the scene as a composition containing a camera layer and one perspective-corrected 3D layer for each PNG file.

The camera is on the negative z axis, at (x,y)=(0,0). The point of interest for the camera is in the center of the composition. The camera zoom is set according to the field of view in the Vanishing Point scene.

The 3D layers for the planes in the scene have a parent layer with its anchor point at the center of the composition, so the whole scene can be transformed together.

Vanishing Point exchange only works well for images that have square pixels in Photoshop.

Bob Donlon provides a tutorial on his blog that shows how to use Vanishing Point Exchange.

Lester Banks provides a video tutorial on his website that demonstrates how to use Vanishing Point in Photoshop Extended and then either bring the 3D scene into After Effects as a .vpe file or bring the 3D scene in as a 3D object layer in a PSD file.

Andrew Kramer provides a video tutorial on his Video Copilot website that shows how to use Vanishing Point Exchange.

Importing PSD files as 3D scenes

Paul Tuersley provides a script on the AE Enhancers website that turns a layered PSD file into a 3D scene in After Effects. The script creates a composition and adds expressions to the layers from the PSD file. When you move the layers along the z axis, the scene looks exactly like the original artwork through the Active Camera view. You can animate the camera around the scene to see that the layers are at different depths in 3D space.

Illustrator 3D effects

The effects in the 3D category in Illustrator—Extrude & Bevel, Revolve, and Rotate—give a three-dimensional appearance to any vector graphics object, including text and drawings. If you want to add depth to your vector art and text, consider creating it in Illustrator, using the 3D effects, and then importing the results into After Effects.

Importing and using 3D files from other applications

After Effects can import 3D-image files saved in Softimage PIC, RLA, RPF, OpenEXR, and Electric Image EI format. These 3D-image files contain red, green, blue, and alpha (RGBA) channels, as well as auxiliary channels with optional information, such as z depth, object IDs, texture coordinates, and more.

Though you can import composited files with 3D information into After Effects, you cannot modify or create 3D models directly with After Effects.

After Effects treats each composited 3D file from another application as a single 2D layer. That layer, as a whole, can be given 3D attributes and treated like any After Effects 3D layer, but the objects contained within that 3D file cannot be manipulated individually in 3D space. To access the 3D depth information and other auxiliary channel information in 3D image files, use the 3D Channel effects. (See .)

3D Channel effect plug-ins from fnord software are included with After Effects to provide access to multiple layers and channels of OpenEXR files. (See .)

After Effects can also import baked camera data, including focal length, film size, and transformation data, from Maya project files as a single composition or two compositions. (See Baking and importing Maya data.)

After Effects imports camera data saved with RLA or RPF sequence files. (See Import RLA or RPF data into a camera layer.)

Softimage PIC files have a corresponding ZPIC file that contains the z-depth channel information. Although you can't import a ZPIC file, you can access the additional channel information as long as the ZPIC file is stored in the same folder as the imported PIC file.

Similarly, Electric Image (EI) files can have associated EIZ files with z-depth channel data. As with ZPIC files, you cannot import EIZ files into After Effects; instead, you simply store them in the same folder as the EI files. For information about creating EIZ files, see your Electric Image documentation.

A common technique when working in a 3D modeling application is to insert null objects, such as null lights or null locator nodes in the locations where you want to composite in an image in After Effects. Then, after you have imported the 3D file into After Effects, you can use these null objects as a reference for the placements of other visual elements.

Online resources about importing and using 3D files from other applications

Lutz Albrecht provides a two-part document on the Adobe website about integrating 3D applications with After Effects. These articles cover the creation of UV maps, mattes, and channels from various 3D applications, including Maxon Cinema 4D, NewTek Lightwave, and Luxology modo. The articles then show you how to use RE:Vision Effects RE:Map and fnord ProEXR plug-ins to use that data in After Effects.

Tyson Ibele provides tutorials on his website that show how to use output from 3ds Max (3D Studio MAX) in After Effects.

Dave Scotland provides a pair of tutorials on the CG Swot website in which he demonstrates how to create RPF files in a 3D application and how to use RPF files in After Effects. The first part explains the RPF format and how to create RPF files in 3DS Max. The second part shows how to use the Object ID and Z depth information in an RPF file within After Effects, using the ID Matte, Depth of Field, Depth Matte, and Fog 3D effects.

Using 3D tracking completes camera movements so that additional elements can be composited into the scene to make it appear to honor the same camera movement. The 3D camera tracker effect analyzes video sequences to extract camera motion and 3D scene data. The 3D camera motion allows you to correctly composite 3D elements over your 2D footage. For details about using the 3D camera tracker effect, see this video tutorial by Angie Taylor from Learn by Video. To know more about 3D camera tracker feature, see Tracking 3D camera movement.

Bartek Skorupa provides a tutorial on his website about using Blender and exporting the animation to After Effects. You can also watch the camera tracking in Blender tutorial that shows focuses on lens distortion issues.

Harrison Ambs provides a two-part video tutorial on the CGTUTS+ website that demonstrates how to import data from Cinema 4D into After Effects:

- Video Part 1
- Video Part 2

The tutorial Use Cinema 4D Lite with After Effects cameras and lights explains how to create an After Effects comp with cameras, lights, and solid layers, and then open it in Cinema 4D Lite to add 3D objects.

Import RLA or RPF data into a camera layer

After Effects imports camera data saved with RLA or RPF sequence files. That data is incorporated into camera layers—one for each camera in the sequence—that After Effects creates in the Timeline panel. You can access the camera data of an imported RLA or RPF sequence and create a camera layer containing that data.

1 Add the sequence to a composition, and select its layer in the Timeline panel.

2 Choose Animation > Keyframe Assistant > RPF Camera Import.

Note:

To create an RLA or RPF file with the camera data in 3D Studio Max, save your rendering in RPF format with Coverage, Z Depth, and Alpha Channels enabled.

Baking and importing Maya data

After Effects imports camera data from Maya project files. Before importing Maya camera information, you need to bake it. Baking camera data makes it easier to animate with keyframes later in your project. Baking places a keyframe at each frame of the animation. You can have 0, 1, or a fixed number of keyframes for each camera or transform property. For example, if a property is not animated in Maya, either no keyframes are set for this property or one keyframe is set at the start of the animation. If a property has more than one keyframe, it must have the same number as all of the other animation properties with more than one keyframe.

Reduce import time by creating or saving the simplest Maya file possible. In Maya, reduce keyframes by deleting static channels before baking, and save a version of the Maya project that contains the camera animation only.

Note:

The following transformation flags are not supported: query, relative, euler, objectSpace, worldSpace, worldSpaceDistance, preserve, shear, scaleTranslation, rotatePivot, rotateOrder, rotateTranslation, matrix, boundingBox, boundingBoxInvisible, pivots, CenterPivots, and zeroTransformPivots. After Effects skips these unsupported flags, and no warnings or error messages appear.

By default, After Effects treats linear units specified in the Maya file as pixels.

You can import camera data from Maya project files *(.ma)* and work with the data as a single composition or two compositions.

For each Maya file you import, After Effects creates either one or two compositions:

- If the Maya project has a square pixel aspect ratio, After Effects creates a single, square-pixel composition containing the camera data and transformations.

- If the Maya project has a nonsquare pixel aspect ratio, After Effects creates two compositions. The first composition, which has a filename prefixed by *Square*, is a square-pixel composition containing the camera data. The second, or *parent*, composition is a nonsquare-pixel composition that retains the dimensions of the original file and contains the square-pixel composition. When working with imported camera data, use 3D layers and square-pixel footage in the square-pixel composition, and use all nonsquare-pixel footage in the containing composition.

When you import a Maya file with a 1-node camera, After Effects creates a camera in the square-pixel composition that carries the camera's focal length, film size, and transformation data.

When you import a Maya file with a 2-node or targeted camera, After Effects creates a camera and an additional parent node in the square-pixel composition. The parent node contains only the camera's transformation data. After Effects imports 2-node cameras automatically with the locator node as the point of interest, with the Auto-Orientation option of the camera set to Orient Towards Point Of Interest.

After Effects doesn't read 3-node cameras.

Note:

After Effects reads only the rendering cameras in Maya files and ignores the orthographic and perspective cameras. Therefore, always generate a rendering camera from Maya, even if it's the same as the perspective camera. If you apply the FilmFit camera setting, make sure to use either horizontal or vertical FilmFit, not fill.

After Effects can read Maya locator nodes, which enable you to track objects from the Maya scene as it is translated into After Effects. After Effects creates a null layer and applies the relevant transformations to it if the name of a Maya locator node contains the word *Null*, *NULL*, or *null*. Avoid parenting locator nodes to each other in Maya; instead, parent the locator nodes to geometry.

Note:

After Effects doesn't read World or Underworld coordinates in the LocatorShape. Use a transform node to place them.

Working with Cinema 4D and Cineware

For detailed information on working with MAXON Cinema 4D files and Cineware (a full-featured workflow integration between Adobe After Effects CC and Cinema 4D), see CINEMA 4D and Cineware.

Working with footage items

Organize, view, manage, and trim footage items

Compositions and footage items are listed in the Project panel. Unlike items in the Timeline panel and Effect Controls panel, the order of items in the Project panel has no influence on the appearance of the movies that you create. You can organize footage items and compositions however you like, including organizing them using folders. Solid-color footage items are automatically placed in the Solids folder.

Folders that you create in the Project panel exist only in the Project panel. You can expand a folder to reveal its contents, and put folders inside other folders. To move a file or folder to the top level of the Project panel, drag it to the gray information area at the top of the panel.

You can use the search field in the Project panel to find footage items that meet various criteria, such as those with missing source files. See Search and filter in the Timeline, Project, and Effects & Presets panels.

For a helpful video tutorial about organizing assets in the Project panel, see this video tutorial by Jeff Sengstack and Infinite Skills.

Scripts for managing footage items

Jeff Almasol provides a script on his redefinery website that automatically writes specified information about footage items or layers to the Comment fields for the respective items in the Project panel or Timeline panel.

Christopher Green provides a script (Project_Items_Renamer.jsx) on his website with which you can rename compositions and footage items selected in the Project panel. You can search and replace text in the names, append characters to the beginning or end of the names, or trim a specified number of characters from the beginning or end of the names.

Lloyd Alvarez provides a script on the After Effects Scripts website with which you can search an After Effects project and replace the file paths for the sources of footage items. This is convenient for swapping out source files, updating a project after moving sources, or updating a project after moving it to a different computer system.

Show information for items

- To show information about a footage item or composition, select it in the Project panel. Information is displayed at the top of the Project panel next to the thumbnail image.
- To show the file creator ID for a footage item, Alt-click (Windows) or Option-click (Mac OS) it in the Project panel.

Create a folder

? Choose File > New > New Folder, or click the Create A New Folder icon at the bottom of the Project panel.

Rename and sort items

- To rename a composition, footage item, or folder, do one of the following:
  - Select the item in the Project panel, press Enter (Windows) or Return (Mac OS), and enter the new name.
  - Right-click (Windows) or Control-click (Mac OS) the item, choose Rename, and enter the new name.
- To rename the Comment column, right-click (Windows) or Control-click (Mac OS) the column heading and choose Rename This.

You can use the Comment column to create a custom sorting option. Rename the column, enter corresponding information for each item (for example, camera number), and then sort by that column.

- To sort items by entries in any column, click the column name in the Project panel.

Copy items

- To duplicate or copy an item in the Project panel, select it and choose Edit > Duplicate or Edit > Copy.
- To copy a footage item to Windows Explorer (Windows) or the Finder (Mac OS), drag the footage item from the Project panel to the desktop.

Reveal footage items

- To reveal where a footage item is used in a composition, right-click (Windows) or Control-click (Mac OS) the footage item in the Project panel and choose Reveal In Composition; then select the specific instance you want to reveal (*composition name*, *layer name*).

- To reveal the source footage item for a layer in the Project panel, right-click (Windows) or Control-click (Mac OS) the layer in the Timeline panel, and then choose Reveal Layer Source In Project.
- To reveal the location of a footage item in Adobe Bridge, Windows Explorer, or the Finder, right-click (Windows) or Control-click (Mac OS) the footage item in the Project panel and choose Reveal In Bridge, Reveal In Windows Explorer, or Reveal In Finder.

Refresh footage items

? To refresh footage items selected in the Project panel to use the current versions of the source footage files, choose File > Reload Footage.

View footage item in the Footage panel or media player assigned by operating system

When items are previewed in the Footage panel, they show the results of the footage interpretation operations. (See Interpret footage items.)

- To open a footage item in a Footage panel, double-click the footage item in the Project panel.
- To open selected footage items in the Footage panel, press Enter on the numeric keypad when the Project panel is active.

Note:

To open the source for a footage item using the player application associated with that file type, Alt-double-click (Windows) or Option-double-click (Mac OS) the footage item in the Project panel. See the documentation for your operating system for instructions for changing the associations between applications and file types.

Trim footage items in the Footage panel

You can use the Set In Point , Set Out Point , Ripple Insert Edit , and Overlay Edit controls in the Footage panel to trim a footage item and insert it into a composition. Trimming in the Footage panel can be more convenient than adding the footage item to a composition and then trimming its layer in the Timeline panel.

Enhanced solids folder organization

You can organize your solids, adjustments layers, and nulls better with enhanced solids folder organization. You can perform the following tasks:

- **Rename the solids folder:** You can rename the existing solids folder and every new solid is created in the renamed folder instead of a separate folder named 'Solids.' To rename the folder, do any of the following options:

Option 1:

1. Select the folder and press Enter (Win) or Return (Mac).
2. Type a new name in the name field.

Option 2:

1. Right-click and choose **Rename**. For example, rename the folder to Color Squares.
2. After renaming the folder, a warning message is displayed when you try to create a solid.
3. Click Yes, and use "Color Squares" to continue using the renamed folder.

4 If you want to create the solid in a new solids folder, click No, use “Solids”.

- **Set a default name for the solids folder:** You can change the default name for solids folder you create in your new projects. To change the name, follow these steps:

1 To open **Preferences** window, select **Preferences > New Project**.

2 In the **Preferences** window, enter the new name in **New Projects Solids Folde**r text box and click **OK**.

Note:

These settings are applied to the new folders you create. Your current projects are not affected.

- **Nest the solids folder in other folders**: You can nest the Solids folder within other folders. Drag the solids folder inside another folder in your current project to nest. Once the folders are nested, new solids continue to be created in the nested folder.

Note:

You can not nest folders in Team Porjects.

- **Set any folder as the solids folder:** You can set a folder as a solids folder. To set a folder as a solids folder, follow the steps:

1 Right-click the preferred folder in the **Project** panel.

2 Choose solids folder from the menu to set it as the solids folder.

Note:

You can only set one folder at a time as the solids folder.

For more information, see Creating layers.

Edit footage in its original application

You can open and edit a footage item in the application in which it was created, directly from an After Effects project. The original application must be installed on the computer that you are using, which must have enough available RAM for it to run. When you edit and save changes to the footage in the original application, the changes are applied to all instances of the footage when After Effects becomes the active application.

Note:

If you’re editing footage that has an alpha channel, make sure that you’re viewing and editing all of the channels, including the alpha channel, in the other application. Otherwise, changes you make may not be applied to the alpha channel, and it may become misaligned with the color channels.

When you edit a still-image sequence selected in the Timeline or Composition panel, the individual image that is currently displayed opens. When you edit a still-image sequence selected in the Project panel, the first image in the sequence opens.

1 In the Project panel, Composition panel, or Timeline panel, select the footage item or a layer that uses the footage item as its source. If you selected a still-image sequence from the Composition or Timeline panel, move the current-time indicator to the frame displaying the still image you want to edit.

2 Choose Edit > Edit Original.

3 Edit the footage in its original application, and save the changes.

Remove items from a project

Before reducing your project, removing unused footage, or consolidating footage, consider making a backup by incrementing and saving your project first. (See Save and back up projects in After Effects.)

Carl Larsen demonstrates the use of the Collect Files command and the Consolidate All Footage command in a video tutorial on the Creative COW website that shows how to organize, consolidate, and archive project files and footage.

- To remove an item from a project, select the item in the Project panel and press Delete.
- To remove all unused footage items from a project, choose File > Remove Unused Footage.
- To remove all duplicate footage items from a project, Choose File > Consolidate All Footage. After Effects considers footage items to be duplicates only if they use the same Interpret Footage settings.

  When a duplicate item is removed, layers that refer to the duplicate item are updated to refer to the remaining copy.
- To remove unselected compositions and unused footage items from selected compositions in the Project panel, choose File > Reduce Project. This command is available only when the Project panel is active.

  This command removes both unused footage items and all other compositions that are not included within a selected composition as nested (subordinate) compositions.

  If the selected composition includes items that are turned off (that is, the Video or Audio switch is deselected in the Timeline panel), the Reduce Project command does not remove those items.

  If an expression in a selected composition refers to an element in a nonsubordinate composition, Reduce Project removes the nonsubordinate composition and the applied expression. A message appears after you choose Reduce Project to remind you of this possibility, so you can undo the command if needed. To avoid removing the expressions from a nonsubordinate composition, drag the nonsubordinate composition into the composition that refers to it. Then deselect the Audio and Video switches for the composition that you added.

The SaveCompAsProject script from Sebastian Perier on the AEScripts website saves selected compositions as individual projects.

Placeholders and proxies

When you want to temporarily use a substitute for a footage item, use either a *placeholder* or a *proxy*.

Placeholder A still image of color bars used to temporarily take the place of a missing footage item. Use a placeholder when you are building a composition and want to try out ideas for a footage item that is not yet available. After Effects generates placeholders automatically, so you do not have to provide a placeholder footage item.

Proxy Any file used to temporarily replace a footage item, but most often a lower-resolution or still version of an existing footage item used to replace the original. Often, storyboard images are used as proxies. You can use a proxy either before you have the final footage or when you have the actual footage item but you want to speed up previewing or rendering of test movies. You must have a file available to use as a proxy.

Any masks, attributes, expressions, effects, and keyframes that you apply to the layer are retained when you replace its placeholder or proxy with the final footage item.

In the Project panel, After Effects marks the footage name to indicate whether the actual footage item or its proxy is currently in use:

- A filled box indicates that a proxy item is currently in use throughout the project. The name of the proxy appears in bold type at the top of the Project panel when the footage item is selected.
- An empty box indicates that the footage item is in use throughout the project, though a proxy has been assigned.
- No box indicates that no proxy is assigned to the footage item.

Work with placeholders and missing footage items

For best results, set the placeholder to the same size, duration, and frame rate as the actual footage.

If After Effects cannot find source footage when you open a project, the footage item appears in the Project panel labeled Missing, and the name of the missing footage appears in italics. Any composition using that item replaces it with a placeholder. You can still work with the missing item in the project, and any effects you applied to the original footage remain intact. When you replace the placeholder with the source footage, After Effects places the footage in its correct location in all the compositions that use it.

You can find footage items for which the source items are missing by typing missing in the search field in the Project panel. See Search and filter in the Timeline, Project, and Effects & Presets panels.

- To use a placeholder, choose File > Import > Placeholder.
- To replace the selected footage item with a placeholder, choose File > Replace Footage > Placeholder.
- To replace a placeholder with the actual footage item, select the placeholder you want to replace in the Project panel, choose File > Replace Footage > File, and locate the actual footage.

Work with proxies for footage items

When you use a proxy, After Effects replaces the actual footage with the proxy in all compositions that use the actual footage item. When you finish working, you can switch back to the actual footage item in the project list. After Effects then replaces the proxy with the actual footage item in any composition.

When you render your composition as a movie, you may choose to use either all the actual high-resolution footage items or their proxies. You may want to use the proxies for a rendered movie if, for example, you simply want to test motion using a rough movie that renders quickly.

For best results, set a proxy so that it has the same frame aspect ratio as the actual footage item. For example, if the actual footage item is a 640x480-pixel movie, create and use a 160x120-pixel proxy. When a proxy item is imported, After Effects scales the item to the same size and duration as the actual footage. If you create a proxy with a frame aspect ratio that is different from the frame aspect ratio of the actual footage item, scaling takes longer.

? In the Project panel, do any of the following:

- To locate and use a proxy, select a footage item, choose File > Set Proxy > File, locate, and select the file you want to use as a proxy, and click Open.
- To toggle between using the original footage and its proxy, click the proxy indicator to the left of the footage name.
- To stop using a proxy, select the original footage item, and choose File > Set Proxy > None.

Create a proxy

Use the Create Proxy command to create a proxy from footage or compositions selected in the Project panel or the Timeline panel. This command adds the selected footage to the Render Queue panel and sets the Post-Render Action option to Set Proxy.

1. Open a footage item or composition in the Project or Timeline panel.
2. Move the current-time indicator in the Footage panel to the frame that you want to use as the proxy still item, or for the poster frame for the movie footage item.

3 Choose one of the following commands:

- File > Create Proxy > Still to create a still image proxy.
- File > Create Proxy > Movie to create a moving image proxy.

4 Specify a name and output destination for the proxy.

5 In the Render Queue panel, specify render settings, and click Render.

Create placeholders for output

You can create placeholder files that can be used in different compositions. For example, you can create a placeholder for an item in the render queue that will create a 24-fps movie and then drag that placeholder into a 30-fps composition. Then, when you render the 30-fps composition, After Effects first renders the placeholder at 24 fps and uses this rendered version as it renders the 30-fps composition.

? Drag the Output Module heading for a queued item from the Render Queue panel to the Project panel. After Effects creates a placeholder for output in the Project panel and sets the Post-Render Action option for the item to Import & Replace Usage.

Loop a footage item

If you intend to loop a visual footage item continuously in your project, you only need to create one cycle of the footage item in After Effects.

1 In the Project panel, select the footage item to loop.

2 Choose File > Interpret Footage > Main.

3 Type an integer value for Loop and click OK.

Lloyd Alvarez provides a script on the After Effects Scripts website that automatically loops a footage item, composition, or layer.

Freeze on last frame

You can now freeze the last frame of a layer until the end of the composition. After Effects sets time remapping keyframes in the layer and extends the layer duration until the end of the composition.

To freeze the composition on the last frame of your footage, choose **Layer > Time > Freeze on Last Frame**.

CINEMA 4D and Cineware

CINEMA 4D is a popular 3D modeling and animation tool from Maxon (www.maxon.net).

Closer integration with CINEMA 4D allows you to use Adobe After Effects and Maxon CINEMA 4D together. You can create a CINEMA 4D file (*.c4d*) from within After Effects and you can work with complex 3D elements, scenes, and animations.

To enable interoperability, CineRender, the Maxon CINEMA 4D rendering engine, is integrated with Adobe After Effects. After Effects can render CINEMA 4D files, and you can control some aspects of rendering, camera, and scene content on a per-layer basis. This streamlined workflow does not require you to create intermediate pass or image sequence files.

Maxon CINEMA 4D Lite R21

Maxon CINEMA 4D Lite R21 gets installed along with After Effects with the folder name - Maxon Cinema 4D R21. You can create, import, and edit CINEMA 4D files. However, if you have a full retail version of CINEMA 4D, you can use that instead. You can use the tools such as caps and bevel for creating extruded text and splines.

- You can use the Cineware plug-in as usual by importing .c4d project files, and exporting. This is especially useful when you render with R20 and R21 files.
- The default Cineware renderer provides the same rendering capabilities as Cinema 4D R21. If you have a full version of Cinema 4D, you may still target it as renderer through **Options > Choose Cinema 4D installation**, including using Cinema 4D with installed 3rd party plugins.

The CINEMA 4D Lite R21 application gives you the ability to edit, create, and work with native CINEMA 4D files. The default behavior uses the higher version of the installed CINEMA 4D application.

See this tutorial to learn to use CINEMA 4D Lite with After effects cameras and lights.

Install Cinema 4D Lite R21

Install After Effects as usual. The installation progress pauses at about 80% during installation of the Maxon Cinema 4D R21 component.

Uninstall Cinema 4D Lite R21

- **Mac**:

Use the uninstalller inside the "Maxon Cinema 4D R21" folder. Then manually drag the "Maxon Cinema 4D R21" folder to the trash.

- **Win**:

Use the uninstaller inside the "Maxon Cinema 4D R21" folder.

- Maxon preferences can be manually deleted if needed from the following locations:
  - Mac: /Users/user_name/Library/Preferences/MAXON
  - Win: C:\Users\user_name\AppData\Roaming\MAXON
- It is not advised to uninstall only the Maxon folder as that will impact the After Effect Cineware and 3D rendering functionality.

Working with CINEMA 4D files

There are several options available to create, import, and edit CINEMA 4D files from within After Effects.

Import CINEMA 4D files

To import CINEMA 4D files into After Effects, do the following:

1. Choose **File > Import > File**.
2. Select the CINEMA 4D file and click **Import**. The file is placed in the **Project** panel as a footage item. You can place the footage item on an existing composition, or create a matching composition.

Note:

When you place the footage on a new composition using the new composition icon in the project panel, a composition is created that matches the CINEMA 4D file settings and then a CINEMA 4D layer is created and the 3D scene is placed on it. If you drop the footage in an existing composition, the footage picks up the composition size/aspect instead.

Note:

*Before importing, enable **Save Polygons For Melange** and **Save Animation For Melange preferences** in CINEMA 4D application preferences. These settings are especially useful in cases where CINEMA 4D frames depend on previous frames.*

Edit CINEMA 4D files

You can edit CINEMA 4D files placed in compositions or CINEMA 4D source items in the Project. The files open in the CINEMA 4D Lite R21 application. If you have a different version of CINEMA 4D installed, that is used to edit the file instead. See Edit footage in its original application.

You can choose the version of CINEMA 4D you want to use with **Edit Original**. See Working with different instances of CINEMA 4D in Cineware Effect

For more information, see the video by Jeff Sengstack on Importing and editing CINEMA 4D files.

Create CINEMA 4D files

1. You can create a CINEMA 4D file within After Effects. To do so, select **File > New > Maxon CINEMA 4D File** or **Layer > New > Maxon CINEMA 4D File**.
2. Specify a name and location of the file.
3. The CINEMA 4D application opens.
4. Create a C4D scene and select **File > Save** to save the file.

For more information, see this video by Jeff Sengstack on Creating CINEMA 4D files.

Export to Maxon CINEMA 4D and roundtrip your edits using Live 3D Pipeline

You can export your compositions with 3D animated text and shape layers to Maxon CINEMA 4D using the After Effects' Live 3D pipeline for round-tripped 3D workflow.

3D Shape layers are exported as extruded spline objects, and includes animation of shape layer properties.

The Extrude Text as Shapes option exports 3D text layers as extruded spline objects in the .c4d file. This option retains the fidelity of the layer: character and paragraph formatting, and animation of text layer properties. You cannot modify the font and text content in CINEMA 4D.

The Preserve Editable Text option exports 3D text layers as extruded text objects in the .c4d file. In this option, you can modify the font and text in CINEMA 4D. However, this option has limited support for character and paragraph formatting, and animation of text layer properties. Text animation features that are not supported include: text animators, kerning, tracking, vertical text, paragraph text, and text on path.

Strokes are exported for 3D text and shape layers into the .c4d file. While the Ray-traced 3D renderer in After Effects does not render strokes for 3D text layers, strokes are still exported when enabled. To view 3D text layer strokes before exporting, make sure that the composition renderer is set to Classic 3D.

Export to Maxon CINEMA 4D

To export to Maxon CINEMA 4D:

1. Select **File > Export > Maxon CINEMA 4D Exporter** and save the C4D file.
2. In the **Export to Maxon CINEMA 4D** dialog box, select one of the following:
   - Extrude Text as Shapes: Creates a .c4d file with basic extrusion.
   - Preserve Editable Text: Exports 3D text layers as extruded text objects in the .c4d file, allowing you to modify the font and text in CINEMA 4D.

Note:

- If your text is unlikely to change after export, it is recommended to choose CINEMA 4D: Extrude Text as Shapes option in the Text Exporting dialog box.
- When you export, the scene coordinates for the parent null object is shifted so that the center of an After Effects composition matches CINEMA 4D's center at 0,0,0.
- The exported .c4d files are saved in CINEMA 4D version 17.0.

Import the .c4d file and edit it in Maxon CINEMA 4D

You can import the .c4d file that you have created in to your After Effects composition for editing. Choose Edit > Edit Original to edit the .c4d file in CINEMA 4D.

When you import and add a .c4d file that was created by the Cineware 3.1 version of the Exporter to your composition, you can view the scene through an After Effects camera by first adding a camera and then setting the Camera setting in the Cineware effect to Centered Comp Camera.

Any After Effects 3D layers that you add to the composition line up with the CINEMA 4D scene layer after export. The extracted 3D Scene data from the .c4d file such as nulls, cameras, and lights also line up, provided that any new objects added to the .c4d file are grouped under the same parent null object as created in the exported .c4d file.

To open the exported CINEMA 4D file in After Effects and CINEMA 4D for advanced 3D edits:

1. Select **File > Import** and select the .c4d file to import it to your composition.
2. To customize the 3D elements using CINEMA 4D, select the **Cineware** layer and select **Edit > Edit Original** (or press the keyboard shortcut *Command + E* on Mac OS or *Control + E* on Windows). The C4D file opens in CINEMA 4D, which is included in After Effects CC.
3. Make changes and save the file. Your After Effects composition is automatically updated with all the changes.

Cineware effect

The integration of CineRender, which is based on the CINEMA 4D render engine, enables rendering of layers based on CINEMA 4D files directly in After Effects. The Cineware effect lets you control the render settings, and provides some control over the render quality-speed tradeoff. You can also specify cameras, passes, or C4D layers used for a render. The Cineware effect is automatically applied when you create a layer based on C4D footage on the composition. Each CINEMA 4D layer has its own render and display settings.

For more information, see Understanding the Cineware effect and render engine.

Synchronize Layer

When adding multiple instances of a CINEMA 4D scene layer in a composition, including adding Multi-Pass layers, you can select the CINEMA 4D layers that are to be synchronized with the rest of the layers in the composition.

When you check the **Synchronize AE Layer** option at the top of the Effect Controls panel, the Render Settings and Camera options on all instances of the layer automatically synchronize, but CINEMA 4D layers can be set independently. If the check box is disabled for a specific CINEMA 4D scene layer, none of that layer's settings synchronize with the rest of the layers in the composition.

Live Link

Live Link synchronizes the timelines of CINEMA 4D and After Effects.

To work with Live Link, click the Enable button for Live Link. The specified CINEMA 4D version opens the current file. To enable Live Link in CINEMA 4D, choose Edit > Preferences > Communication > Live Link, and then select Live Link Enabled At Startup. The timelines are synchronized when switching between After Effects and CINEMA 4D. When you select a different C4D layer in After Effects, press Enable to synchronize that layer.

Render settings

The Cineware render settings determine how to render the scene inside After Effects. These settings can help you speed up the rendering process while you're working.

Renderer Determines which renderer to use. The following options are available:

- **Standard (Final)**: Uses the Standard renderer as specified in the C4D file. Use the CINEMA 4D application to edit these settings.
- **Standard (Draft)**: Uses the Standard renderer but turns off slower settings like anti-aliasing for better interactivity.
- **Software**: Uses the settings to provide the fastest rendering, by letting you choose **Display settings**. Shaders and multi-passes are not displayed. Use the Software renderer to preview while you continue to work on the composition.
- **OpenGL**: Hardware-accelerated rendering for better quality and higher speed as compared to the software render option. The OpenGL renderer in CINEWARE supports the same level of enhanced OpenGL quality as CINEMA 4D for the Transparency, Shadows, Post effects, and Noises properties.

Note:

When you save your .c4d file in a full retail version of CINEMA 4D (not CINEMA 4D Lite R19, which is bundled with After Effects) with Render Settings set to the Physical or Hardware renderer, your file is rendered with those settings when the CINEWARE renderer is set to Standard (Final) or Standard (Draft).

Display This option is only enabled when you choose the **Software** renderer. The available options are **Current Shading**, **Wireframe**, and **Box**. The wireframe and box modes provide a simplified representation of the scene.

No Textures/Shader Check this option to speed up your render by not rendering textures and shaders.

No pre-calculation Check this option to speed up your render by disabling pre-calculations for computing motion dynamics or particle simulations. Do not check this option for final rendering.

Keep Textures in RAM Check this option to cache textures in the RAM so that they are not reloaded from disk and can be accessed more quickly. On the other hand, if you cache large textures, it may lead to reduction in available RAM.

Render Server Purge Memory: Clears the memory of the render server. Over a period, the response of the render server might degrade as it continues to store the scenes being processed. Clearing the up memory that the render server uses for internal caches can help After Effects extend the length of previews of complex scenes.

Project Settings

The following project settings are available in the Cineware effect:

- Camera
- CINEMA 4D Layers
- Multi-Pass (Linear Workflow)
- Commands

Camera Choose the camera to use for rendering.

CINEMA 4D Camera: Uses the camera that is defined as the render view camera in CINEMA 4D, or the default camera if none is defined.

Select CINEMA 4D camera: Use this option to choose a camera. When this option is enabled, click Set Camera.

Centered Comp Camera: Use this option to use the After Effects camera, and recalculate the CINEMA 4D co-ordinates to adapt to the After Effect co-ordinates. When you import an existing C4D file (typically modeled around 0,0,0) to be rendered with a new After Effects camera (which is centered on the composition), use this option to render the C4D model in the After Effects center. Otherwise the model may be unexpectedly shifted due to origin difference.

Comp Camera: Use this option to use the active After Effects camera. For this option to work, you must have added an After Effects camera. For example, use this option for a camera that has been added by extracting it from a Cinema 4D project (since those cameras reference CINEMA 4D's coordinate system with 0,0,0 at the center of the CINEMA 4D viewport). This option is suited for cameras that are added to After Effects by using the **Layer > New > Camera** command.

Set Camera: If a CINEMA 4D scene contains cameras other than the default camera, click this button and select the camera.

Set Take: This option is enabled if your c4d file contains takes. You can create multiple takes of your scene and modify any parameter in a take. If the current renderer does not support take selections, the main take is used.

CINEMA 4D Layers Enable and select the CINEMA 4D layers to render.

Set Layers Click to choose layers. Click the **Set Layers** button to choose one or more layers. In CINEMA 4D, layers let you organize multiple elements. You can use CINEMA 4D layers to composite between elements in the After Effects comp.

Multi-Pass (Linear Workflow) Use the **Cinema 4D Multi-Pass** option to specify which pass to render. The multi-pass features are only available when using the **Standard** renderer.

Multi-passes give you the ability to quickly make fine adjustments to a C4D scene by compositing different kinds of passes together in After Effects, such as adjusting just the shadows or reflections in the scene. For the results to match CINEMA 4D's default **Linear Workflow** project setting, you must work in a project in which colors are blended in linear light (either in a color-managed linear working space or with **Blend Colors Using 1.0 Gamma** set in the **Project Settings** dialog box).

Set Multi-Pass Click to select which pass to render on this layer. This option is only available if CINEMA 4D Multi-Pass option is enabled.

Defined Multi-Passes When enabled, adds the passes explicitly added in the *.c4d* file. This can include passes other than Image Layers.

Add Image Layers Use this option to create multiple pass layers with proper blending modes depending on the setting of **Defined Multi-Passes**. When the Defined Multi-Passes option is enabled, **Add Image Layers** restricts you to just adding the passes defined in the CINEMA 4D render settings rather than adding all supported types.

Note:

When adding image layers, the layer that was originally selected are placed at the bottom of the Timeline stack, and renamed with RGBA Image appended to the layer name to reflect its multi-pass type.

Commands Use the following commands.

Comp Camera into CINEMA 4D Click **Merge** to add the current After Effects camera as a C4D camera in the C4D file. This modifies the C4D file. Use **File > Revert to Saved** in C4D to see the newly added After Effects camera. This command is especially useful to transfer camera data created by the **3D Camera Tracker** effect. AE is prefixed to the camera name.

Note: If you merge again, the previous camera is not updated. A new copy is created instead.

CINEMA 4D Scene Data Click **Extract** to create 3D data such as cameras, lights, solids, or nulls for objects that have an External Compositing tag applied in the CINEMA 4D project.

*Always enable **Save Polygons for Melange** option and **Save Animation for Melange** option in the CINEMA 4D preferences to avoid problems extracting scene data in After Effects.*

Note:

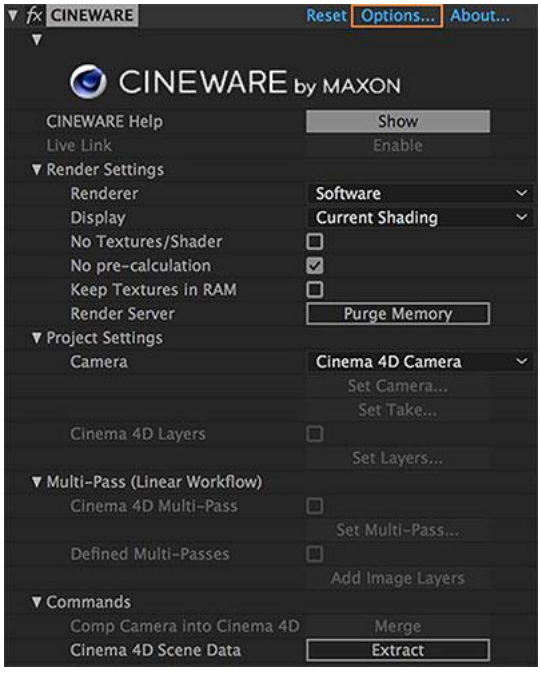
Depending on your computer's security settings, you may see some warnings about TCP communication. This is because After Effects and the background CINEMA 4D renderer communicate using TCP which some security software may interpret as dangerous malware communication. For example, Mac OS may require you to confirm if you want to run this software "downloaded from the Internet". Confirm that you want to run this software.

*If you are able to import a .c4d file, but it fails to render, check if your Mac OS Gatekeeper or your firewall has blocked the background CINEMA 4D renderer from functioning and communicating with After Effects. For Mac users, set **Allow Applications Downloaded From** (under the **General** tab of **Security and Privacy** system preferences) to **Anywhere**.*

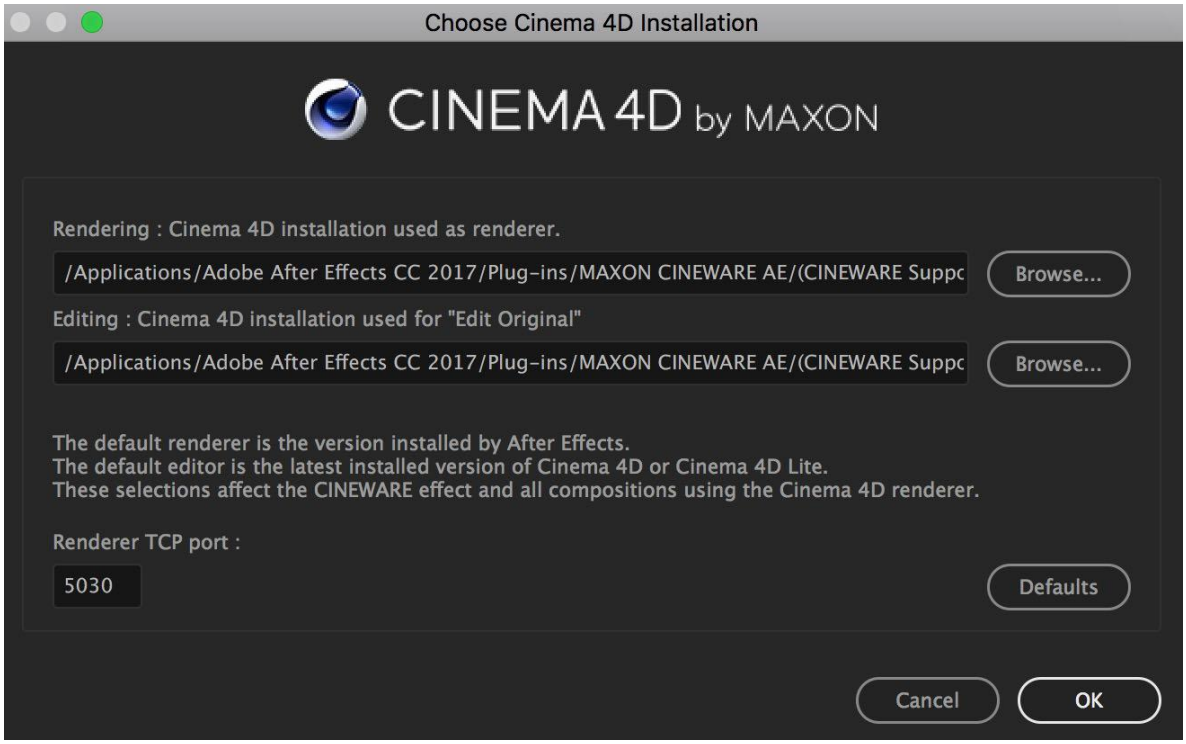
*The TCP port used is defined in the **Options** in the Cineware effect, and this value is stored in the After Effects preferences file.*

Working with different instances of CINEMA 4D in Cineware Effect

You can specify the instance of CINEMA 4D that you want to use in the Cineware effect.



Cineware settings


Choose Cinema 4D Installation
CINEMA 4D by MAXON
Rendering : Cinema 4D installation used as renderer.
/Applications/Adobe After Effects CC 2017/Plug-ins/MAXON CINEWARE AE/(CINEWARE Suppc
Browse...
Editing : Cinema 4D installation used for "Edit Original"
/Applications/Adobe After Effects CC 2017/Plug-ins/MAXON CINEWARE AE/(CINEWARE Suppc
Browse...
The default renderer is the version installed by After Effects.
The default editor is the latest installed version of Cinema 4D or Cinema 4D Lite.
These selections affect the CINEWARE effect and all compositions using the Cinema 4D renderer.
Renderer TCP port :
5030
Defaults
Cancel
OK

CINEMA 4D Render path and Editor path

Select **Cineware Effect** > **Options** and choose from the following settings:

- **CINEMA 4D Render Path** - Choose CINEMA 4D for rendering in After Effects if you have the full retail version of CINEMA 4D installed.
- **CINEMA 4D Editor Path** - Choose the version of CINEMA 4D to use when opening a .c4d file with **Edit Original** or when creating a CINEMA 4D file from After Effects. The default Editor is the latest installed version of CINEMA 4D or CINEMA 4D Lite R19.

The default CINEMA 4D application is located at :

- *C:\\Program Files\\Adobe\\Adobe After Effects CC\\Support Files\\Plug-Ins\\MAXON CINEWARE AE\\(CINEWARE Support)\\lite\\CINEMA 4D Lite.exe* (Windows)
- */Applications/Adobe After Effects CC/Plug-ins/MAXON CINEWARE AE/(CINEWARE Support)/Lite/CINEMA 4D Lite.app* (Mac OS).

*After using a full retail version of CINEMA 4D as renderer, if you want to switch back to the default Cineware renderer, click the **Defaults** button in the **Choose CINEMA 4D Installation** dialog box.*

Switch render paths

Follow the steps below to switch render paths (such as changing CINEMA 4D rendering application):

1 **Options** > **Browse** To Set Render Path

2 Select the new application.

3 Exit After Effects.

4 Launch After Effects.

5 Select **Edit** > **Purge** > **All Memory & Disk Cache** for the new settings to take effect.

If you experience a connection failure after switching the renderer, exit After Effects, wait for 20-30 seconds, and then relaunch the application again.

Rendering capabilities

When you choose CINEMA 4D versions R14 and above as the renderer, you can use various rendering capabilities within the After Effects Cineware plug-in other than the default renderer, such as **Physical** renderer and **Sketch and Toon**.

To use the Physical renderer, do the following:

1 Choose the Physical renderer in the **CINEMA 4D Render Settings** dialog.

   a From the **Render** menu, Select **Render** > **Edit Render Settings**.

   b In the **Render Settings** dialog, set the pop-up to Renderer: Physical.

   c Click **Physical** and set other settings such Depth of Field or Motion Blur options.

2 Save the .c4d file with the renderer settings.

3 The renderer specified in CINEMA 4D is the one that is used by the Cineware effect when the **Renderer Settings** option in the effect is set to **Standard (Final) and Standard (Draft)**.

Note:

*You can control **Sketch and Toon** for individual objects in the Object manager by adding T**ags** > **Sketch Tags** > **Sketch Style** (see the Maxon CINEMA 4D Help documentation for more information about **Sketch and Toon**).*

To render **Sketch and Toon**, do the following:

1 From the **Create** menu in the CINEMA 4D application, select **Create** > **Material** > **Sketch Material**.

   a In the **Render Settings** dialog, set the pop-up to Renderer: Standard.

   b In the **Render Settings** dialog, ensure that **Sketch and Toon** post effects are added and checked.

2 Save the .c4d file with Sketch and Toon enabled.

3 **Sketch and Toon** is rendered by the **Cineware** effect when the renderer settings in the effect is set to **Standard (Final)**.

Note:

The following versions of CINEMA 4D are compatible with Cineware:

- R14.042 or above. Use the CINEMA 4D online updater to install the current version.
- R15.037 or above
- R16
- R17
- R19
- R20

- R21
- R22

See CINEMA 4D Composition Rendererto learn about the new 3D Renderer used for extruding texts and shapes.

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Importing from After Effects and Adobe Premiere Pro

Import an After Effects project

You can import one After Effects project into another. Everything from the imported project—including footage items, compositions, and folders—appears inside a new folder in the current Project panel.

You can import an After Effects project from a different operating system, as long as you maintain the filenames, folder names, and either full or relative paths (folder locations) for all files in the project. To maintain relative paths, the source footage files must reside on the same volume as the project file. Use the File > Collect Files command to gather copies of all files in a project or composition into a single location. (See Cross-platform project considerations.)

1 Choose File > Import > File.

2 Select the After Effects project to import, and click Open.

If the operating system that you are using does not support a file format, if the file is missing, or if the reference link is broken, After Effects substitutes a placeholder item containing color bars. You can reconnect the placeholder to the appropriate file by double-clicking the entry in the Project panel and navigating to the source file. In most cases, you need to relink only one footage file. After Effects locates other missing items if they're in the same location.

Note:

When you render a movie and export it to the QuickTime (MOV), Video for Windows (AVI) format, you can embed a link to the project in the container file. To import the project, import the MOV or AVI file, and choose Project from the Import As menu in the Import File dialog box. If the file contains a link to a project that has been moved, you can browse to locate the project..

Import an Adobe Premiere Pro project

Note:

Importing an Adobe Premiere Pro project into After Effects does not use Dynamic Link. After Effects can't import a Premiere Pro project if one or more sequences in it are already dynamically linked to After Effects. (See Working with Adobe Premiere Pro and After Effects.)

When you import an Adobe Premiere Pro project, After Effects imports it into the Project panel as both a new composition containing each Adobe Premiere Pro clip as a layer, and as a folder containing each clip as an individual footage item. If your Adobe Premiere Pro project contains bins, After Effects converts them to folders within the Adobe Premiere Pro project folder. After Effects converts nested sequences to nested compositions.

Not all features of an Adobe Premiere Pro project are preserved when the project is imported into After Effects. The same features are preserved when you import a Premiere Pro project into After Effects as when you copy and paste between Premiere Pro and After Effects. (See Importing from After Effects and Adobe Premiere Pro.)

After Effects preserves the order of clips in the timeline, the footage duration (including all trimmed In and Out points), and marker and transition locations. After Effects bases the arrangement of layers in the Timeline panel on the arrangement of clips in the Adobe Premiere Pro Timeline panel. After Effects adds Adobe Premiere Pro clips to the Timeline panel as layers in the order in which they appeared—from the bottom up and from left to right—in the Adobe Premiere Pro Timeline panel. After Effects preserves changes made to the speed of a clip, for example, with the Clip > Speed command, and these changes appear as a value in the Stretch column in the After Effects Timeline panel.

After Effects imports effects common to Adobe Premiere Pro and After Effects, and preserves keyframes for these effects.

Transitions and titles (except for dissolves) included in your Adobe Premiere Pro project appear in the After Effects composition as solid layers with their original location and duration.

Audio Level keyframes are preserved.

1 Choose File > Import > File or File > Import > Adobe Premiere Pro Project.

   If you choose Import > Adobe Premiere Pro Project, then only Adobe Premiere Pro projects are shown.

2 Select a project, and click OK.

3 Do any of the following:

   - To import only one sequence, choose a sequence from the menu.
   - To import audio, select Import Audio.

To add a single item from a track in an Adobe Premiere Pro project, copy the item in Adobe Premiere Pro, and choose Edit> Paste in After Effects.

Copy between After Effects and Adobe Premiere Pro

- From the **After Effects** Timeline panel, you can copy layers based on audio or video footage items (including solids) and paste them into the **Adobe Premiere Pro** Timeline panel.
- From the **Adobe Premiere Pro** Timeline panel, you can copy assets (any items in a track) and paste them into the **After Effects** Timeline panel.
- From either **After Effects** or **Adobe Premiere Pro**, you can copy and paste footage items to the other's Project panel.

Note:

*You can't, however, paste footage items from the **After Effects** Project panel into the **Adobe Premiere Pro** Timeline panel.*

If you want to work with all clips or a single sequence from an Adobe **Premiere Pro** project, use the Import command instead to import the project into **After Effects**.

*Use Adobe Dynamic Link to create dynamic links, without rendering, between new or existing compositions in **After Effects** and **Adobe Premiere Pro**. (See About Dynamic Link)*

Copy from After Effects to Adobe Premiere Pro

You can copy a layer based on a footage item from an **After Effects** composition and paste it into an Adobe Premiere Pro sequence. **Adobe Premiere Pro** converts these layers to clips in the sequence and copies the source footage item to its Project panel. If the layer contains an effect that is also used by Adobe **Premiere Pro**, **Adobe Premiere Pro** converts the effect and all of its settings and keyframes.

You can also copy nested compositions, Photoshop layers, solid-color layers, and audio layers. Adobe Premiere Pro converts nested compositions to nested sequences, and solid-color layers to color mattes. You cannot copy shape, text, camera, light, or adjustment layers to **Adobe Premiere Pro**.

1. Start **Adobe Premiere Pro** (you must start Adobe **Premiere Pro** before you copy the layer in **After Effects**).
2. Select a layer (or layers) from the **After Effects** Timeline panel.

   Note:

   *If you select multiple layers and the layers don't overlap in **After Effects**, they're placed on the same track in Adobe **Premiere Pro**. On the other hand, if the layers overlap in After Effects, the order in which you select them determines the order of their track placement in **Adobe Premiere Pro**. Each layer is placed on a separate track, and the last selected layer appears on Track 1. For example, if you select layers from top to bottom, the layers appear in the reverse order in **Adobe Premiere Pro**, with the bottom-most layer on Track 1.*
3. Choose Edit > Copy.
4. In **Adobe Premiere Pro**, open a sequence in the Timeline panel.
5. Move the current-time indicator to the desired location, and choose either Edit > Paste or Edit > Paste Insert.

Results of pasting into Adobe Premiere Pro

When you paste a layer into an **Adobe Premiere Pro** sequence, keyframes, effects, and other properties in the copied layer are converted as follows:

After Effects item	**Converted to in Adobe Premiere Pro**	**Notes**
Audio volume property	Channel Volume filter	
Blending modes	Blending modes supported by Adobe Premiere Pro are converted	
Effect properties and keyframes	Effect properties and keyframes, if the effect also exists in **Adobe Premiere Pro**	**Adobe Premiere Pro** lists unsupported effects as offline in the Effect Controls panel. Some **After Effects** effects have the same names as those in **Adobe Premiere Pro**, but since they're actually different effects, they aren't converted.
Expressions	Not converted	
Layer markers	Clip markers	
Masks and mattes	Not converted	
Stereo Mixer effect	Channel Volume filter	
Time Remap property	Time Remapping effect	

After Effects item	Converted to in Adobe Premiere Pro	Notes
Time Stretch property	Speed property	Speed and time stretch have an inverse relationship. For example, 200% stretch in **After Effects** converts to 50% speed in **Adobe Premiere Pro**.
Transform property values and keyframes	Motion or Opacity values and keyframes	The keyframe type—Bezier, Auto Bezier, Continuous Bezier, or Hold—is retained.
Source settings for R3D source files	Source settings for R3D source files	

Copy from Adobe Premiere Pro to After Effects

You can copy a video or audio asset from an **Adobe Premiere Pro** sequence and paste it into an **After Effects** composition. **After Effects** converts assets to layers and copies the source footage items into its Project panel. If the asset contains an effect that is also used by **After Effects**, **After Effects** converts the effect and all of its settings and keyframes.

You can copy color mattes, stills, nested sequences, and offline files, too. **After Effects** converts color mattes into solid-color layers and converts nested sequences into nested compositions. When you copy a Photoshop still image into **After Effects**, **After Effects** retains the Photoshop layer information. You cannot paste **Adobe Premiere Pro** titles into **After Effects**, but you can paste text with attributes from the Adobe Premiere Titler into **After Effects**.

1. Select an asset from the **Adobe Premiere Pro** Timeline panel.
2. Choose Edit > Copy.
3. In **After Effects**, open a composition in the Timeline panel.
4. With the Timeline panel active, choose Edit > Paste. The asset appears as the topmost layer in the Timeline panel.

   Note:

   To paste the asset at the current-time indicator, place the current-time indicator and press Ctrl+Alt+V (Windows) or Command+Option+V (Mac OS).

Results of pasting into After Effects

When you paste an asset into an **After Effects** composition, keyframes, effects, and other properties in a copied asset are converted as follows:

Adobe Premiere Pro asset	Converted to in **After Effects**	Notes
Audio track	Audio layers	Audio tracks that are either 5.1 surround or greater than 16-bit aren't supported. Mono and stereo audio tracks are imported as one or two layers.
Bars and tone	Not converted	
Blending modes	Converted	
Clip marker	Layer marker	
Color mattes	Solid-color layers	
Crop filter	Mask layer	
Frame Hold	Time Remap property	

Mask	Converted	All mask properties in Premiere Pro, for example, feather, opacity, expansion, and so on, get copied in After Effects when you copy the mask into an After Effects composition.
Motion or Opacity values and keyframes	Transform property values and keyframes	Keyframe type—Bezier, Auto Bezier, Continuous Bezier, or Hold—is retained.
Sequence marker	Markers on a new solid-color layer	To copy sequence markers, you must either copy the sequence itself or import the entire **Adobe Premiere Pro** project as a composition.
Speed property	Time Stretch property	Speed and time stretch have an inverse relationship. For example, 50% speed in **Adobe Premiere Pro** is converted to 200% stretch in **After Effects**.
Time Remapping effect	Time Remap property	
Titles	Not converted	
Universal counting leaders	Not converted	
Video and audio transitions	Opacity keyframes (Cross dissolve only) or solid-color layers	
Video effect properties and keyframes	Effect properties and keyframes, if the effect also exists in **After Effects**	**After Effects** doesn't display unsupported effects in the Effect Controls panel.
Volume and Channel Volume audio filters	Stereo mixer effect	Other audio filters are not converted.
Source settings for R3D source files	Source settings for R3D source files	

Note:

*When you import a **Premiere Pro** project into **After Effects**, features are converted in the same manner as they are converted when copying from **Premiere Pro** to **After Effects**.*

Preparing and importing still images

Preparing still-image files for importing

You can import individual still images into After Effects or import a series of still images as a sequence. For information about the still-image formats that After Effects imports, see Supported import formats.

After Effects works internally in an RGB color space, but it can import and convert CMYK images. However, when possible, you should work in an RGB color space in applications such as Illustrator and Photoshop when creating images for video, film, and other non-print media. Working in RGB provides a larger gamut and more accurately reflects your final output.

Before you import a still image into After Effects, prepare it as completely as possible to reduce rendering time. It is usually easier and faster to prepare a still image in its original application than to modify it in After Effects. Consider doing the following to an image before importing it into After Effects:

- Make sure that the file format is supported by the operating system you plan to use.
- Crop the parts of the image that you do not want to be visible in After Effects.

Note:

Illustrator files can have fractional dimensions (for example, 216.5x275.5 pixels). When importing these files, After Effects compensates for the fractional dimensions by rounding up to the next whole number of pixels (for example, 217x278 pixels). This rounding results in a black line at the right (width) or bottom (height) edge of the imported image. When cropping in Illustrator, make sure that the dimensions of the cropped area are whole numbers of pixels.

- If you want to designate areas as transparent, create an alpha channel or use the transparency tools in applications such as Photoshop or Illustrator.
- If final output will be broadcast video, avoid using thin horizontal lines (such as 1-pixel lines) for images or text because they may flicker as a result of interlacing. If you must use thin lines, add a slight blur so that the image or text appears in both video fields instead of flickering between them. (See Interlaced video and separating fieldsand Best practices for creating text and vector graphics for video.)
- If final output will be broadcast video, make sure that important parts of the image fall within the action-safe and title-safe zones. When you create a document in Illustrator or Photoshop using a preset for film and video, the safe zones are shown as guide lines. (See Safe zones, grids, guides, and rulers.)
- If the final output will be broadcast video, keep colors within the broadcast-safe ranges. (See Broadcast-safe colors.)
- Save the file using the correct naming convention. For example, if you plan to import the file into After Effects on Windows, use a three-character filename extension.
- Set the pixel dimensions to the resolution and frame aspect ratio that you will use in After Effects. If you plan to scale the image over time, set image dimensions that provide enough detail at the largest size the image has in the project. After Effects supports a maximum image size of 30,000x30,000 pixels for importing and rendering files. The size of image that you can import or export is influenced by the amount of physical RAM available to After Effects. The maximum composition dimensions are also 30,000x30,000 pixels.

Note:

The image size or pixel dimensions setting in Photoshop (or other image-editing application) is relevant for the preparation of image data for import into After Effects—not dpi (dots per inch) or ppi (pixels per inch) settings. The image size determines how many pixels wide and tall an image is, whether those pixels are the tiny ones on a mobile device or the big ones on a motion billboard. The dpi or ppi settings are relevant to printing an image and to the scale of copied and pasted paths.

Import a single still image or a still-image sequence

You can import still image files as individual footage items, or you can import a series of still image files as a still-image sequence, which is a single footage item in which each still image is used as a single frame.

To import multiple image files as a single still-image sequence, the files must be in the same folder and use the same numeric or alphabetic filename pattern (such as Seq1, Seq2, Seq3).

When you import a file that appears to After Effects to be one file in a still-image sequence, After Effects by default imports all other files in the same folder that appear to be in the same sequence. Similarly, when you select multiple files that appear to be in a sequence, After Effects by default imports them as a sequence. You can see what After Effects is about to import by looking at the bottom of the Import dialog box. You can also import images and sequences by dragging files and folders into the Project panel.

To prevent After Effects from importing unwanted files when you want to import only a single file, or to prevent After Effects from interpreting multiple files as a sequence, deselect the Sequence option in the Import dialog box. After Effects remembers this setting and thereafter uses it as the default.

You can import multiple sequences from the same folder simultaneously by selecting files from different sequences and selecting Multiple Sequences at the bottom of the Import dialog box.

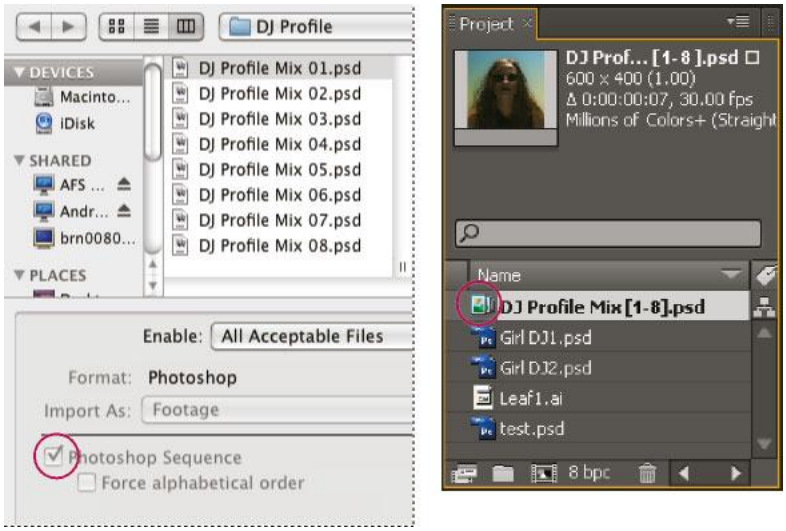
When importing a sequence of still images, you can use the Force Alphabetical Order option in the Import dialog box to import a sequence with gaps in its numbering (for example, Seq1, Seq2, Seq3, Seq5). If you import a sequence with gaps in its numbering without selecting this option, After Effects warns you of missing frames and replaces them with placeholders (if the Report Missing Frames option is checked in Edit > Preferences > Import).

After Effects uses settings of the first image in the sequence to determine how to interpret the images in the sequence.

If the image files in a sequence are of a layered file type—such as Adobe Photoshop or Adobe Illustrator documents—then you can choose to import the sequence as a standard footage item, or as a composition in which each layer in each file is imported as a separate sequence and appears as a separate layer in the Timeline panel.

Note:

When you render a composition that contains a numbered sequence, the output module uses the start frame number as the first frame number. For example, if you start to render on frame 25, the name of the file is 00025.



A sequence of still-image files (left) becomes one image sequence when imported into After Effects (right).

Verify individual image sequence files

When you import image sequence files in After Effects CC 2015.3 and later versions, it does not individually verify every file in the sequence. This accelerates the image sequence import process, especially when you import from network storage. However, if the sequence includes files that are aliases or shortcuts that do not resolve, for example if the drive is offline, After Effects does not report those files as missing.

If you encounter unexpected missing frames while importing an image sequence, you can enable the Verify Individual Files option, which is comparatively slower, but verifies all files in the sequence (**Edit > Preferences > Import and enable the Sequence Footage: Verify Individual Files**).

Import a still-image sequence as a single footage item

1 Choose File > Import > File.

2 Select any file in the sequence. To import a subset of files in a sequence, select the first file, hold down Shift, and then select the last file to import.

3 Choose Footage from the Import As menu.

4 Click Open (Windows) or Import (Mac OS).

5 Click OK.

If at any time you decide that you want access to the individual components of the footage item, you can convert it to a composition. See Convert a merged footage item into a composition.

Import a still-image sequence as a composition

When you import a Photoshop or Illustrator file as a composition, you have access to the individual layers, blending modes, adjustment layers, layer styles, masks, guides, and other features created in Photoshop or Illustrator. The imported composition and a folder containing each of its layers as footage items appears in the Project panel.

1 Choose File > Import > File.

2 Select any file in the sequence. To import a subset of files in a sequence, select the first file, hold down Shift, and then select the last file to import.

3 Choose one of the following from the Import As menu:

Composition - Retain Layer Sizes Import the layers, each with its original dimensions.

One reason to import as a composition with layers at their original dimensions (rather than importing each layer at the composition frame size) is so that each layer has its anchor point set at the center of the cropped graphics object, rather than at the center of the composition frame. This more often makes transformations work more as you'd expect and prefer when animating individual layers of an imported graphic item. For example, if you have a car with a separate layer for each wheel, importing as a composition with layers at their original sizes puts the anchor point of each wheel in the center of the wheel, which makes rotating the wheels work as you'd expect.

Composition Import layers and have the dimensions of each match the dimensions of the composition frame.

4 Click Open (Windows) or Import (Mac OS).

Convert a merged footage item into a composition

When you import a layered file, such as a Photoshop or Illustrator file, as footage, all of its layers are merged together. If at any time you decide that you want access to the individual components of the footage item, you can convert it to a composition.

- To convert all instances of a footage item, select it in the Project panel and choose File > Replace Footage > With Layered Comp.
- To convert only one instance of the footage item, select the layer in the Timeline panel, and choose Layer > Convert To Layered Comp.

Note:

It may take a few moments to convert a merged footage item to a layered composition.

Change the frame rate of a sequence

When you import a sequence of still images, it assumes the frame rate specified by the Sequence Footage preference in the Import category. The default rate is 30 frames per second (fps). You can change the frame rate after importing by reinterpreting the footage item:

? Select the sequence in the Project panel, choose File > Interpret Footage > Main, and then enter a new value for Assume This Frame Rate.

For more information, see Frame rate.

Preparing and importing Photoshop files

Note:

For information and instructions that apply to all kinds of still image files, see Preparing still-image files for importingand Import a single still image or a still-image sequence.

Note:

In After Effects CS6 and later, video layers in Photoshop .psd documents are not supported.

Because After Effects includes the Photoshop rendering engine, After Effects imports all attributes of Photoshop files, including position, blending modes, opacity, visibility, transparency (alpha channel), layer masks, layer groups (imported as nested compositions), adjustment layers, layer styles, layer clipping paths, vector masks, image guides, and clipping groups.

Before you import a layered Photoshop file into After Effects, prepare it thoroughly to reduce preview and rendering time. Avoid problems importing and updating Photoshop layers by doing the following:

- Organize and name layers. If you change a layer name in a Photoshop file after you have imported it into After Effects, After Effects retains the link to the original layer. However, if you delete a layer, After Effects is unable to find the original layer and lists it as Missing in the Project panel.
- Make sure that each layer has a unique name. This is not a requirement of the software, but helps to keep you from becoming confused.
- If you think that you might add layers to the Photoshop file in Photoshop after you have imported it into After Effects, go ahead and add a small number of placeholder layers before you import the file into After Effects. When you refresh the file in After Effects, it will not pick up any layers that have been added since the file was imported.
- Unlock layers in Photoshop before importing into After Effects. This is not necessary for most kinds of layers, but it is required for some kinds of layers. For example, background layers that must be converted to RGB may not be imported correctly if they are locked.

A convenient command within After Effects is Layer > New > Adobe Photoshop File, which adds a layer to a composition and then opens the source of that layer in Photoshop for you to begin creating a visual element, such as a background layer for your movie. The layer in Photoshop is created with the correct settings for your After Effects composition. As with many of the Creative Suite applications, you can use the Edit Original command in After Effects to open a PSD file in Photoshop, make and save changes, and have those changes appear immediately in the movie that refers to the PSD source file. Even if you don't use Edit Original, you can use the Reload Footage command to have After Effects refresh its layers to use the current version of the PSD file. (See Create a layer and new Photoshop footage itemand Edit footage in its original application.)

Note:

One good way to prevent interlace flicker from thin horizontal lines in still images is to run the Interlace Flicker Removal action in Photoshop before you bring the still images into After Effects. Photoshop includes several video actions for utility purposes such as this.

Color modes

Layered Photoshop (PSD) files need to be saved in RGB or Grayscale color mode for After Effects to import them as a composition and to separate the layers. CMYK, LAB, Duotone, Monotone, and Tritone color modes are not supported for layered files; After Effects will import a file that uses one of these color modes as a single, flattened image. (Regarding the other color modes available in Photoshop such as Bitmap and Indexed: Photoshop does not support layers in these color modes.)

To determine or change the color mode of a document in Photoshop, choose Image > Mode. (The color mode is also displayed in the title bar of the document window.)

Masks and alpha channels

Adobe Photoshop supports a transparent area and one optional layer mask (alpha channel) for each layer in a file. You can use these layer masks to specify how different areas within a layer are hidden or revealed. If you import one layer, After Effects combines the layer mask (if present) with the transparent area and imports the layer mask as a straight alpha channel.

If you import a layered Photoshop file as a merged file, After Effects merges the transparent areas and layer masks of all the layers into one alpha channel that is premultiplied with white.

When you import a Photoshop file as a composition, vector masks are converted to After Effects masks. You can then modify and animate these masks within After Effects.

Photoshop clipping groups, layer groups, and Smart Objects

If the layered Photoshop file contains clipping groups, After Effects imports each clipping group as a precomposition nested within the main composition. After Effects automatically applies the Preserve Underlying Transparency option to each layer in the clipping-group composition, maintaining transparency settings. These nested precompositions have the same dimensions as the main composition.

Photoshop layer groups are imported as individual compositions.

It is often valuable to group layers into Smart Objects in Photoshop so that you can import meaningful collections of Photoshop layers as individual layers in After Effects. For example, if you used 20 layers to create your foreground object and 30 layers to create your background object in Photoshop, you probably don't need to import all of those individual layers into After Effects if all that you want to do is animate your foreground object flying in front of your background object; consider grouping them into a single foreground Smart Object and a single background Smart Object before importing the PSD file into After Effects.

Photoshop layer styles and blending modes

After Effects also supports blending modes and layer styles applied to the file. When you import a Photoshop file with layer styles, you can choose the Editable Layer Styles option or the Merge Layer Styles Into Footage option:

Editable Layer Styles Matches appearance in Photoshop and preserves supported layer style properties as editable.

Note:

A layer with a layer style interferes with intersection of 3D layers and the casting of shadows.

Merge Layer Styles Into Footage Layer styles are merged into the layer for faster rendering, but the appearance may not match the appearance of the image in Photoshop. This option doesn't interfere with intersection of 3D layers or casting of shadows.

Preparing and importing Illustrator files

Note:

For information and instructions that apply to all kinds of still image files, see Preparing still-image files for importingand Import a single still image or a still-image sequence.

Before you save an Illustrator file for importing into After Effects, consider doing the following:

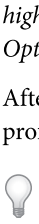
- Create your document in Illustrator using one of the Video And Film document profiles. In addition to creating a document at the appropriate size for video or film work, this creates a document with two artboards: one at the appropriate frame size, and one much larger. When you bring such a document into After Effects, the area outside the smaller artboard isn't cropped and lost; it's retained outside of the composition frame. This only works for an Illustrator document with multiple layers imported as a composition.
- To ensure that Illustrator files appear correctly in After Effects, select Create PDF Compatible File in the Illustrator Options dialog box.
- To copy paths between Illustrator and After Effects, make sure that the Preserve Paths option is selected in the Files & Clipboard section of the Illustrator Preferences dialog box.
- To ensure that files rasterize most faithfully in After Effects, save your file in AI format instead of Illustrator 8.x or 9.x EPS format.
- To separate objects in an Illustrator file into separate layers, use the Release To Layers command in Illustrator. Then, you can import the layered file into After Effects and animate the layers separately.
- If you are working with Edit Original to move objects and layers in Illustrator, import the Illustrator document into After Effects as a composition with document-sized layers (not using the Retain Layer Size option).

When you import an Illustrator file, After Effects makes all empty areas transparent by converting them into an alpha channel.

Note:

When you've imported an Illustrator file, you can specify whether anti-aliasing is to be performed at higher quality or at higher speed. Select the footage item in the Project panel and choose File > Interpret Footage > Main, and click the More Options button at the bottom of the dialog box.

After Effects does not read embedded color profiles from Illustrator files. To ensure color fidelity, assign an input color profile to the Illustrator footage item that matches the color profile with which the Illustrator file was created.



After Effects can't read blending modes from AI documents saved as a version later than Illustrator CS2. If you need to retain blending mode information when importing a file into After Effects from Illustrator, save the document as an Illustrator CS2 document.

For information on preserving sharpness of vector graphics (avoiding pixelation), see Continuously rasterize a layer containing vector graphics.

Importing camera raw files with Camera Raw

You can import sequences of camera raw files much as you import sequences of other kinds of still image files.

After Effects applies the settings for the first camera raw image in the sequence to all of the images in the sequence that do not have their own XMP sidecar files. After Effects does not check the Camera Raw database for image settings.

Note:

Camera raw files are uncompressed. Their large size may increase rendering time.

- Choose File > Import > File.
- Select the camera raw file, and click Open.
- Make any necessary adjustments in the Camera Raw dialog box, and click OK.

You can adjust a camera raw image after importing it. To open the image in the Camera Raw dialog box, select the footage item in the Project panel, choose File > Interpret Footage > Main, and click More Options.

Note:

You can't assign an input color profile to a camera raw image for use in a color-managed project. For information on how colors are automatically interpreted, see Interpret a footage item by assigning an input color profile.

Cineon and DPX footage items

A common part of the motion-picture film production workflow is scanning the film and encoding the frames into the Cineon or DPX file format. The DPX (Digital Picture Exchange) format is a standard format closely related to the Cineon format.

You can import Cineon 4.5 or Digital Picture Exchange (DPX) files directly into an After Effects project as individual frames or as a sequence of numbered stills. Once you have imported a Cineon or DPX file, you can use it in a composition and then render the composition as an image sequence.

To preserve the full dynamic range of motion-picture film, Cineon files are stored using logarithmic 10-bpc color. However, After Effects internally uses 8-bpc, 16-bpc, or 32-bpc color, depending on the color bit depth of the project. Work with Cineon files in a 16- or 32-bpc project—by default, After Effects stretches the logarithmic values to the full range of values available.

Cineon data has a 10-bit white point of 685 and a 10-bit black point of 95. Values above 685 are retained, but are treated as highlights. Rather than abruptly clipping highlights to white, After Effects interprets highlights using a gradual ramp defined by the Highlight Rolloff value. You can modify the 10-bit white point and 10-bit black point input levels and the output (converted) white point and black point levels to match your specific footage items or creative needs.

Use a project color depth of 32 bpc when working with Cineon footage items so that highlights are preserved, in which case you don't need to roll off the highlights.

When you choose DPX/Cineon Sequence from the Format menu in the Output Module Settings dialog box, you can then open the Cineon Settings dialog box to set output options. Choose whether to output DPX (.dpx) files or FIDO/Cineon 4.5 (.cin) files in the File Format section of the Cineon Settings dialog box.

After Effects provides three basic ways of working with the colors in Cineon footage items:

- The easiest—and recommended—way is to enable color management and assign an input color profile to a Cineon footage item in the Color Management tab of the Interpret Footage dialog box, corresponding to the film stock on which the footage was recorded. If creating output for film, use the same profile as the output color profile so that the output file matches the film stock. One advantage of using color management features to work with Cineon footage items is that compositing with images from other footage types is made easier. See Interpret a footage item by assigning an input color profile.
- If you need the settings for the interpretation of the Cineon footage item to change over time, then you can apply the Cineon Converter effect to a layer that uses the Cineon footage item as its source. See .
- If you need to manually modify the settings for a Cineon footage item, or if you don't want to use color management, then you can use the Cineon Settings dialog box. To open this dialog box, click the Cineon Settings button in the Color Management tab of the Interpret Footage dialog box.

Manual settings in the Cineon Settings dialog box:

Converted Black Point Specifies the black point used for the layer in After Effects.

Converted White Point Specifies the white point used for the layer in After Effects.

10 Bit Black Point Specifies the black level (minimum density) for converting a 10-bit Cineon layer.

10 Bit White Point Specifies the white level (maximum density) for converting a 10-bit Cineon layer.

Current Gamma Specifies the target gamma value.

Highlight Rolloff Specifies the rolloff value used to correct bright highlights. To get over range values when working in 32 bpc, set the value to 0.

Logarithmic Conversion Converts the Cineon sequence from log color space to the target gamma specified by the Current Gamma setting. When you're ready to produce output from the Cineon file, it is important that you reverse the conversion. (To convert from logarithmic to linear, set Current Gamma to 1.)

Units Specifies the units After Effects uses to display dialog values.

Chapter 5: Views and previews

Previewing

Preview video and audio

Though it is common to speak of rendering as if this term only applies to final output, the processes of creating previews for the **Footage**, Layer, and Composition panels are also kinds of rendering.

You can preview all or part of your composition as you work, without rendering to final output. Many of the controls for previewing are in the Preview panel.

Use preview to play video and audio

After Effects allocates RAM to play video and audio in the Timeline, Layer, or Footage panel at real-time speed. The number of frames that can be stored for real-time playback depends on the amount of RAM available and the settings in the Preview panel.

The default preview behavior is configured to produce a preview that represents a real-time playback. When you press *spacebar* (the default keyboard shortcut), After Effects starts a preview with audio, and caches frames until the available RAM is filled.

? To start a preview of video and audio, do any of the following:

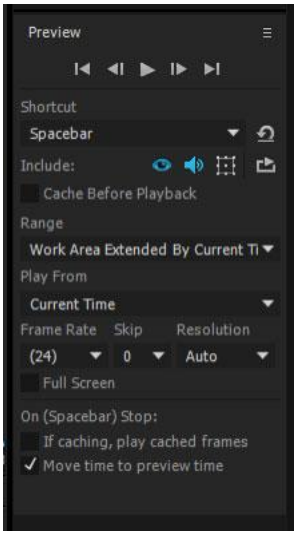
- Press any Preview keyboard shortcut **Spacebar**, **Shift+spacebar**, **Numpad-0**, **Shift+Numpad-0**, or **Option/Alt+Numpad-0.** Each keyboard shortcut results in a different Preview behavior, based on the Preview settings assigned to each of the keys. You can configure the Preview behavior for each keyboard shortcut by modifying settings in the Preview panel. For more information, see Configure Preview Behaviors.
- Click the ▶ (Play) button in the Preview panel. When you click the Play button, settings assigned for the Shortcut currently displayed in the Preview panel, are used.
- Select **Composition** > **Preview** > **Play**. When you select the Play option, settings assigned for the shortcut currently displayed in the Preview panel are used.

Configure Preview behaviors

You can configure the Preview options to suit your working style. Controls in the Preview panel allow you to configure preview behaviors for each keyboard shortcut (*Spacebar, Shift+spacebar, Numpad-0,Shift+Numpad-0, Numpad-*, or *Option/Alt+Numpad-*) audio, looping, caching, range, and layer controls.

To configure settings for Preview, do the following:

1 The Preview panel is open by default in most workspaces within After Effects. However, if the Preview panel is closed, select **Window** > **Preview** to open it.



Preview panel

2 In the Preview panel, you can modify the following settings to configure Preview behavior:

Shortcut Choose a keyboard shortcut to play/stop a preview: **Spacebar**, **Shift+spacebar**, **Numpad-0**, **Shift+Numpad-0,** or **Option/Alt+Numpad-0 .** The Preview behavior depends on the settings specified for the currently selected **keyboard shortcut**.

Reset Restore default preview settings for all **Shortcut** keys.

*To restore preview settings for all keyboard shortcuts to closely match their behaviors in previous versions (After Effects CC 2014 and earlier), hold the Option **(Mac OS)** or Alt **(Windows)** key, and click the Reset button.*

Include Video: When enabled, the preview plays video.

Include Audio: When enabled, the preview plays audio.

Include Overlays and Layer Controls: When enabled, the preview shows overlays (for example, grids and guides) and layer controls for selected layers as defined in the **View > View Options** dialog box. This can be enabled regardless of whether Include Video is enabled.

Viewer panel overlays include guide lines, safe margins, grids, and 3D reference axes. To choose which overlays to show for the current viewer, open the Choose Grid and Guide options menu at the bottom of the viewer panel.

While a preview is playing back, you can dynamically show or hide layer controls using: *Cmd* + *Shift* + *H***(Mac OS)** or *Control* + *Shift* + *H***(Windows)**.

Loop: Specify if you want the Preview to play in a loop.

Note: Showing or hiding layer controls during a preview does not affect the state of the Layer controls option in the Preview panel.

Note: You cannot simultaneously disable all the three Include buttons. At least one button must remain enabled. When you disable the third button, one of the other buttons is enabled.

Cache Before Playback: When you enable this option, After Effects caches frames before starting playback. This option is not enabled by default for any of the preview shortcuts. If you Option- (Mac OS) or Alt- (Windows) click the Reset button in the Preview panel, Cache Before Playback is enabled for Numpad-0.

Range Defines the range of frames that are previewed:

- **Work Area**: Only the frames within the work area.
- **Work Area - Extended by Current Time**: Work area is dynamically extended with reference to the position of the current-time indicator (CTI).
  - If the CTI is placed before the work area, the length of the range is from the current time to the work area end point.
  - If the CTI is placed after the work area, the length of the range is from the start point to the current time. If From Current Time is enabled, the length of the range is from the start point to the last frame of the composition, layer, or footage.
  - If the CTI is placed inside the work area, the range is the work area with no extension.
- **Entire Duration**: All frames of the composition, layer, or footage.
- **Play Around Current Time**: When you start a preview with Play Around Current Time enabled, the preroll value is subtracted from the current time, the postroll value is added to the current time, and the frames in-between are previewed.

  To set the preroll and postroll values:

  1. Select **Range > Play Around Current Time**.
  2. In the Play Around Current Time settings dialog box, set your desired preroll and postroll values in seconds.
  3. Click OK.

Frame Rate Specify a Frame Rate for the preview. Select Auto if you want the preview and composition frame rates to be equal.

Skip Select the number of frames you want to skip while previewing to improve playback performance.

Resolution Specify preview resolution. Value specified in the Resolution drop-down overrides resolution setting of the composition.

Choose one or more of the following behaviors to occur when you stop a preview with the current shortcut or the Play button:

- **If caching, play cached frames**: When this option is enabled and you use this shortcut to stop a preview before caching has completed, only caching is stopped. Playback of cached frames restarts from the beginning of the range. When this option is disabled, stopping a preview with this shortcut stops both caching and playback.
- **Move time to preview time**: When this option is enabled and you use this shortcut to stop a preview, the Current Time moves to the position of the Preview Time.

Stop a Preview

You can stop a preview using any of the following:

- Press any of the preview keyboard shortcuts: **Spacebar**, **Shift+spacebar**, **Numpad-0**, **Shift + Numpad-0**, or Option/Alt+Numpad-0.
- Click the **Play/Stop** button in the Preview panel.
- Choose **Composition** > **Preview** > **Play Current Preview**.

- Press the **Esc** key.

The following actions also cause After Effects to stop a preview:

- Click into the previewing viewer panel. Clicking on the tab of the viewer panel will not stop the preview.
- Adjust a property of time, such as the Work Area bar or Time Navigator bar.
- Drag the current-time indicator (CTI) or click in the time ruler, without the Option (Mac OS) or Alt (Windows) key held down. This action also changes the current time.
- Change the composition settings of a previewing composition.
- Hide the previewing viewer panel behind another panel in the workspace. For example, click a different panel in the same group or open a new viewer panel in the same group.
- Start the render queue.

The Play/Stop button in the Preview panel and **Composition** > **Preview** > **Play Current Preview** are linked to the shortcut currently displayed in the Preview panel. Using these actions to stop a preview has the same result as pressing the currently displayed keyboard shortcut.

Default preview settings

The following are the default preview settings for each of the preview keyboard shortcuts:

Spacebar	**Shift + Spacebar**	**Numpad-0**
• **Play video in preview**: On • **Play audio in preview**: On • **Show overlays and layer controls**: Off • **Cache before playback**: Off • **Range**: Work area extended by current time • **Play From**: Current Time • **Frame Rate**: Auto. • **Skip**: 0 • **Resolution**: Auto • **Full Screen**: Disabled When the **Spacebar** is used to stop a preview: • **If caching, play cached frames**: Enabled • **Move time to preview time**: Enabled	• **Play video in preview**: On • **Play audio in preview**: On • **Show overlays and layer controls**: Off • **Cache before playback**: Off • **Range**: Work Area extended by current time • **Play From**: Current Time • **Frame Rate**: Auto • **Skip**: 0 • **Resolution**: Auto • **Full Screen**: Disabled When the **Shift + Spacebar** is used to stop a preview: • **If caching, play cached frames**: Enabled • **Move time to preview time**: Disabled	• **Play video in preview**: On • **Play audio in preview**: On • **Show overlays and layer controls**: Off • **Cache before playback**: off • **Range**: Work Area • **Play From**: Start of Range • **Frame Rate**: Auto • **Skip**: 0 • **Resolution**: Auto • **Full Screen**: Disabled When the **Numpad-0** is used to stop a preview: • **If caching, play cached frames**: Enabled • **Move time to preview time**: Disabled

Shift + Numpad-0	Numpad-0	Alt + Numpad-0
• **Play video in preview**: On • **Play audio in preview**: On • **Show overlays and layer controls**: Off • **Cache before playback**: Off • **Range**: Work Area extended by current time • **Play From**: Start of Range • **Frame Rate**: Auto • **Skip**: 1 • **Resolution**: Auto • **Full Screen**: Disabled When the **Shift+Numpad-0** is used to stop a preview: • **If caching, play cached frames**: Enabled • **Move time to preview time**: Disabled	• **Play video in preview**: Off • **Play audio in preview**: On • **Show overlays and layer controls**: Off • **Cache before playback**: Off • **Range**: Work Area Extended by Current Time • **Play From**: Current Time • **Frame Rate**: Auto • **Skip**: 0 • **Resolution**: Auto • **Full Screen**: Disabled When the **Numpad+0** is used to stop a preview: • **If caching, play cached frames**: Enabled • **Move time to preview time**: Disabled	• **Play video in preview**: Off • **Play audio in preview**: On • **Show overlays and layer controls**: On • **Cache before playback**: Off • **Range**: Work Area • **Play From**: Start of Range • **Frame Rate**: Auto • **Skip**: 0 • **Resolution**: Auto • **Full Screen**: Disabled When the **Alt+Numpad-0** is used to stop a preview: • **If caching, play cached frames**: Enabled • **Move time to preview time**: Disabled

Preview only audio

When you preview only audio, it plays immediately at real-time speed, unless you've applied audio effects other than Stereo Mixer, in which case you may have to wait for audio to render before it plays.

Set the sample rate for audio for the entire project in the Project Settings dialog box (File > Project Settings).

The Audio Hardware and Audio Output Mapping preferences determine the behavior of audio previews. The output module settings determine the quality of audio in final output. In the Audio Hardware pane of the Preferences dialog box (Edit > Preferences > Audio Hardware), you can select the device class, map the default output and change the settings, and set the latency.

Manually preview (scrub) video and audio

- To manually preview (scrub) video in the Timeline panel or go to a specific frame, drag the current-time indicator.
- To scrub audio in the Timeline panel, Ctrl+Alt-drag (Windows) or Command+Option-drag (Mac OS) the current-time indicator (CTI).
- To scrub audio and video in the Timeline panel, Ctrl-drag (Windows) or Command-drag (Mac OS) the current-time indicator (CTI).

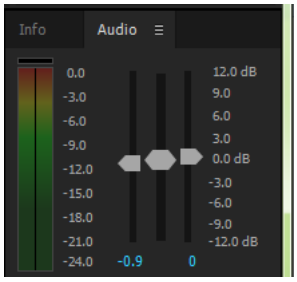
If you stop moving the current-time indicator (CTI) with the mouse button depressed while scrubbing with audio, a short section of audio loops.

To manually preview (scrub) only the frames that are already rendered and cached into the RAM cache, press Caps Lock before dragging the current-time indicator (CTI). This prevents After Effects from trying to render other frames when you drag over or past them. This technique is useful when you want to manually preview some frames that you rendered using preview settings that used an option to skip every other frame.

Audio panel options

During previews, the Audio panel volume unit (VU) meter actively displays audio volume levels. At the top of the VU meter, signals indicate when the audio is *clipping*—a distortion that occurs when the audio signal exceeds the maximum level that the audio device allows.

To view the VU meter and levels controls in more detail, increase the height of the Audio panel.



Choose options in the Audio Panel

Choose Options in the Audio panel menu to specify the following options:

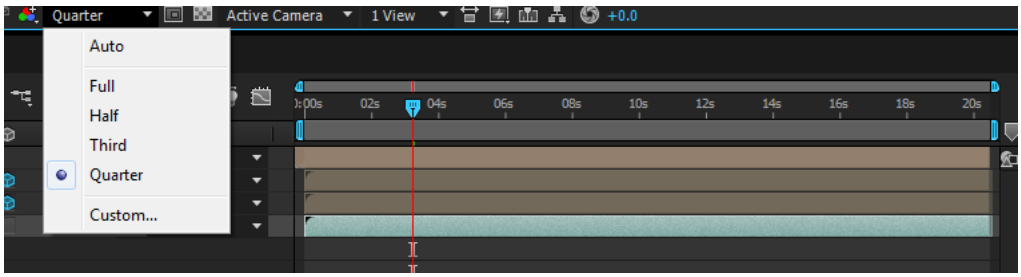
Units Choose whether to display audio levels in decibels or in percentages. 100% equals 0 decibels (0 dB).

Slider Minimum The minimum audio level to display in the Audio panel.

Additional tips and options for previewing

- With all previewing methods—as with rendering to final output—a layer is visible in rendered previews only if its Video layer switch is selected.
- The following are some of the factors that influence the speed with which previews are rendered:
  - Layer switches
  - Fast Previews settings
  - Preference settings
  - Composition settings

Use the **Resolution/Down Sample Factor** settings menu which is one of the simplest and most influential of the preview settings controls. Choose a value other than **Full** from this menu to see all previews at a lower resolution.



Setting resolution for preview

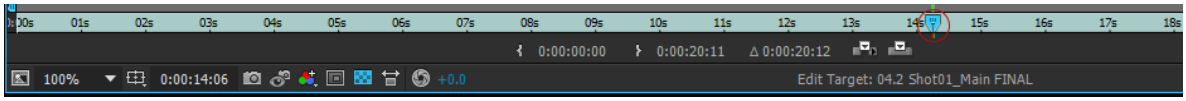
To turn pixel-aspect ratio correction on or off for previews, click the Toggle Pixel Aspect Ratio Correction button at the bottom of the panel. The quality of the pixel aspect ratio correction is determined by the Zoom Quality preference. (See Viewer Quality preferences.)

- When possible, preview on the same kind of device that your audience use to view your final output. For example, you can preview on an external video monitor.
- If color management is enabled, you can preview a composition, layer, or footage item as it appears in the output color space. (See Simulate how colors will appear on a different output device.)

Note:

Select Show Rendering Progress In Info Panel And Flowchart (Edit > Preferences > Display (Windows) or After Effects > Preferences > Display (Mac OS)) to see additional information in the Info panel or the project Flowchart panel during rendering, either for previews or for final output.

Move the current-time indicator (CTI)

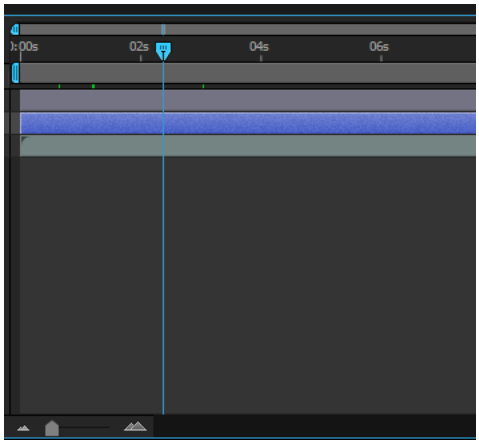


CTI in layer window

The most basic way of previewing frames is to manually preview by moving or dragging the current-time indicator (CTI).

The time ruler visually represents the time dimension of a composition, a layer, or a footage item. In a Layer or Footage panel, the time ruler appears near the bottom of the panel. For a Composition panel, the time ruler appears in the corresponding Timeline panel. The time rulers in different panels represent different durations. The time ruler in a Layer or Footage panel represents the duration of the contents of that panel; the time ruler in the Timeline panel represents the duration of the entire composition.

On a time ruler, the current-time indicator indicates the frame you are viewing or modifying.



CTI in Timeline panel

- To go forward or backward one frame, click the Next Frame or Previous Frame button in the Preview panel, or press Page Down or Page Up.
- To go forward or backward ten frames, Shift-click the Next Frame or Previous Frame button, or press Shift+Page Down or Shift+Page Up.
- To go forward a specific period of time or number of frames, click the current-time display, and then enter the plus sign (+) followed by the timecode or number of frames to advance. For example, enter *+20* to go forward 20 frames or *1:00* to go forward one second. Precede the value by the minus sign (-) to go backward. For example, enter *+-20* to go backward 20 frames or *+-1:00* to go backward one second.
- To go to the first or last frame, click the First Frame or Last Frame button in the Preview panel, or press Home or End.
- To go to the first or last frame of the work area, press Shift+Home or Shift+End.
- To go to a specific frame, click in the time ruler; click the current-time display in the Footage, Layer, Composition, or Timeline panel; or press Alt+Shift+J (Windows) or Option+Shift+J (Mac OS). You can also drag the current-time display in the Timeline panel to modify the value.
- Shift-drag the current-time indicator to snap to keyframes, markers, In and Out points, the beginning or end of the composition, or the beginning or end of the work area.

If you scrub the CTI while a preview is playing, preview stops. To scrub the CTI without stopping a preview, hold Option/Alt while scrubbing.

Zoom in or out in time for a composition

- In the Timeline panel, click the Zoom In button or the Zoom Out button , or drag the zoom slider between the buttons.
- On the main keyboard, press the = (equal sign) key to zoom in or press the – (hyphen) key to zoom out in time.
- Drag the Time Navigator Start or Time Navigator End brackets to zoom in or out on a section of the composition time ruler.

Note:

When you click the Time Navigator in the Timeline panel, the Info panel shows the times of the beginning and end of the Time Navigator duration.

- To zoom out to show the entire composition duration, press Shift+; (semicolon) with the Composition panel or Timeline panel active. Press Shift+; again to zoom back in to the duration specified by the Time Navigator.
- To zoom out to show the entire composition duration, Shift-double-click the Time Navigator. Shift-double-click it again to zoom back in to the duration specified by the Time Navigator.
- To zoom in to show individual frames in the time ruler, double-click the Time Navigator. Double-click the Time Navigator again to zoom out to show the entire composition duration.
- To zoom in the Composition, Layer, Footage, and Timeline panels using multi-touch gestures using two fingers, pinch your fingers closer together to zoom out or move your fingers farther apart to zoom in.

For additional ways to zoom and scroll in time using the mouse scroll wheel, see Scroll or zoom with the mouse wheel.

When zoomed in time, press D to center the time graph on the current time.

Choose a viewer to always preview

Designating a viewer as the default panel to preview is especially useful when you have a Composition viewer that represents your final output and you always want to preview that viewer, even when you're changing settings in other panels.

The panel that's set to always preview appears frontmost for the duration of the preview.

- Click the Always Preview This View button in the lower-left corner of the panel. OR
- Click the Primary Viewer button in the lower-left corner of the panel.

Primary Viewer Button

The **Primary Viewer** button is located next to the **Always Preview This View** button in the lower left of the Composition, Layer, and Footage viewer panels.

Primary Viewer functions similarly to **Always Preview This View**, except that **Primary Viewer** only defines which viewer or view is used for audio and external video preview.

- Only one view can be set as Primary Viewer; enabling it for a viewer or view disables it in any other viewer or view where it had previously been enabled.
- When Primary Viewer is disabled, the most recently active viewer or view is used for audio and external video preview.
- When you switch to a different viewer or view, that viewer or view takes control of audio and external video preview.

Note:

When multiple views are open, previews use the frontmost composition view for 2D compositions and the Active Camera view for 3D compositions. To turn off the Active Camera, deselect Previews Favor Active Camera in the Preview panel menu.

Preview modes and Viewer Quality preferences

After Effects provides several options for previewing that make various tradeoffs between speed and fidelity.

Preview modes and Fast Previews preferences

Each preview mode provides a different balance between quality and speed for playback and for updating of images during interactions, such as when you drag a layer in the Composition panel or modifying a property value in the Timeline panel.

Draft 3D and Live Update modes apply to all views of a composition.

Draft 3D Disables lights, shadows, and depth-of-field blur for cameras. To turn Draft 3D mode on or off, click the Draft 3D button at the top of the Timeline panel.

Live Update Updates images in the Composition or Layer panel during interactions. When Live Update is deselected, After Effects displays wireframe representations during interactions.

To temporarily toggle Live Update mode, hold Alt (Windows) or Option (Mac OS) while dragging to move a layer, modify a property value, or move the current-time indicator (CTI).

To prevent After Effects from updating images in the Footage, Layer, and Composition panels, press Caps Lock. When you make a change that would otherwise appear in a panel, After Effects adds a red bar at the bottom of the panel with a text reminder that image refresh is disabled. After Effects continues to update panel controls such as motion paths, anchor points, and mask outlines as you move them. To resume panel updates and display all changes, press Caps Lock again. Pressing Caps Lock is a good way to prevent views from being refreshed for each frame during rendering for final output.

Note:

When you are using OpenGL to render previews and are previewing on a video monitor, the preview shown on the video monitor doesn't update as you interact with elements of your composition until you have released the mouse at the end of an interaction. (See Preview on an external video monitor.)

Fast Previews

The Fast Previews options range from higher quality but slower performance (Off), to lower quality but higher performance (Wireframe).

Off (Final Quality) Fast Previews is off. Use this mode when previewing the final quality of your composition.

Adaptive Resolution Attempts to downsample footage while dragging a layer or scrubbing a property value. For the ray-traced 3D compositions, Adaptive Resolution reduces the ray-tracing quality based on the current adaptive resolution:

- At 1/2, the ray-tracing quality value is cut in half.
- At 1/4, it is reduced to at most 4.
- At 1/8 or 1/16, it is reduced to at most 2.

You can change the adaptive resolution limit in Edit > Preferences > Previews (Windows) or Premiere Pro > Preferences > Previews (Mac OS).

Draft Available in ray-traced 3D compositions only. This option reduces the ray-tracing quality (number of rays fired by the ray tracer) to 1.

Fast Draft When laying out a complex scene, or if you are working in a ray-traced 3D composition, you can use Fast Draft mode for previewing. In ray-traced 3D compositions, Fast draft mode renders beveled, extruded, and curved 3D layers. When previewing, the scene is downsampled to speed up the loading of textures to the GPU. In Fast Draft mode, each frame of video is still read into the renderer as needed. The downsample factor is set at 1/4 resolution, and effects and track mattes are on.

Wireframe Useful for setting up and previewing complex compositions.

- In Draft, Fast Draft, and Wireframe modes, the Current Renderer menu button's lightning bolt appears orange. In Adaptive Resolution, it appears orange when the composition is downsampled. In these modes, the name of the mode appears in the upper-right corner of the Composition view.
- If adjusting a property or scrubbing through the Timeline takes a long time in Final Quality mode, Adaptive Resolution, or Draft modes, the scene temporarily switches to show wireframes. The frame finishes rendering when you stop moving the mouse.
- If you are in a ray-traced 3D composition in Draft mode, and then switch to it to a Classic 3D composition, the fast preview mode automatically switches to Adaptive Resolution.
- If you want to update more than one active view when scrubbing while holding down the Ctrl (Windows) or Command (Mac OS) key, enable the "Share View Options" option in the Select View Layout pop-up menu.
- Click the Current Renderer menu button in the upper-right corner of the Composition panel to quickly open the current renderer settings in the Composition Settings dialog box. This method is applicable to a 3D layer, camera, or light in the composition.

Changing the Fast Previews mode to match your workflow is important, especially when working with ray-traced 3D compositions.

Keyboard shortcuts for Fast Previews

Quality name	Shortcut
Off (Final Quality)	Ctrl+Alt+1 (Windows) / Cmd+Option+1 (Mac OS)
Adaptive Resolution	Ctrl+Alt+2 (Windows) / Cmd+Option+2 (Mac OS)
Draft	Ctrl+Alt+3 (Windows) / Cmd+Option+3 (Mac OS)
Fast Draft	Ctrl+Alt+4 (Windows) / Cmd+Option+4 (Mac OS)
Wireframe	Ctrl+Alt+5 (Windows) / Cmd+Option+5 (Mac OS)

Viewer Quality preferences

In the **Previews** preferences category, you can choose the quality and speed of color management and zoom operations used in previews.

From the **Zoom Quality** or **Color Management Quality** menu, choose one of the following:

- Faster
- More Accurate Except Cached Preview
- More Accurate

The **Zoom Quality** preference affects the quality of scaling performed for pixel aspect ratio correction in the **Composition** and **Layer** panels.

Note:

When the Show Channel menu is set to an option that shows straight colors (RGB Straight, Alpha Overlay, or Alpha Boundary), the Viewer Quality preference is ignored, and the preview is created as if the Viewer Quality settings were Faster.

Region of interest (ROI)

The region of interest (ROI) is the area of the composition, layer, or footage item that is rendered for previews. Create a smaller region of interest to use less processing power and memory when previewing, thereby improving interaction speed and increasing preview duration.

By default, changing the region of interest does not affect file output. You can change the size of your composition and select what portion is rendered by cropping to the region of interest.

Note:

When the region of interest is selected, the Info panel displays the horizontal and vertical distances of the top (T), left (L), bottom (B), and right (R) edges of the region from the upper-left corner of the composition.

- To draw a region of interest, click the Region Of Interest button at the bottom of the Composition, Layer, or Footage panel, and then drag to select a viewable area of the panel.

To start over with the marquee tool, hold down Alt (Windows) or Option (Mac OS) and click the Region Of Interest button.

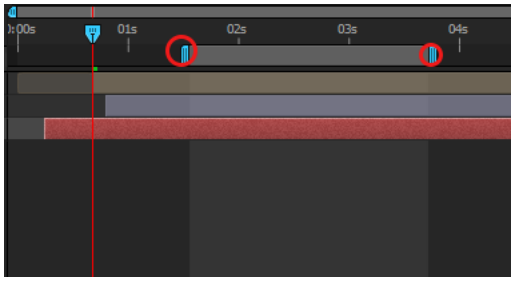
- To switch between using the region of interest and using the full composition, layer, or footage frame, click the Region Of Interest button.
- To move or resize the region of interest, drag its edges or handles. Shift-drag a corner handle to resize while preserving aspect ratio.
- To crop the composition to the region of interest, choose Composition > Crop Comp To Region Of Interest.
- To crop the output to the region of interest, choose Use Region Of Interest in the Crop section of the Output Module Settings dialog box. (See Output module settings.)

To create the equivalent of a region of interest for a single layer, you can draw a temporary mask around the part of the layer that you are working with. The area outside the mask is not rendered. This can make working with a small portion of a large layer much faster. Be careful, though, since not rendering the pixels outside the mask can change the composition's appearance significantly. (See Create masks.)

Work area

The *work area* is the part of the duration of a composition that is rendered for previews or final output. In the Timeline panel, the work area appears in a lighter shade of gray.

- To set the work area start time or end time to the current time, press B (begin) or N (end), respectively.
- To set the work area, move the start and end work area markers in the time ruler.



Work area markers indicate the composition duration rendered for previews or final output.

- To move the work area, drag the center of the work area bar left or right.
- To expand the work area to the size of the composition, double-click the center of the work area bar.
- To show the duration of the work and the times of its beginning and end in the Info panel, click the work area bar.

Snapshots

When you want to compare one view to another in a Composition, Layer, or Footage panel, take a *snapshot*. For example, you may want to compare two frames at different times in a movie.

Snapshots taken in one kind of panel can be displayed in another kind. For example, you can take a snapshot of a Layer panel and display the snapshot in a Composition or Footage panel. Displaying a snapshot does not replace the content of the panel. If the snapshot has a different size or aspect ratio than the panel in which you display it, the snapshot is resized to fit the current view.

Snapshots are for reference only and do not become part of the layer, composition, or rendered movie.

A sound is generated when you take a snapshot.

- To take a snapshot, click the Take Snapshot button at the bottom of the panel or press Shift+F5, Shift+F6, Shift+F7, or Shift+F8.
- To view the most recent snapshot taken with the Take Snapshot button or Shift+F5, click and hold the Show Snapshot button at the bottom of the panel.
- To view a specific snapshot, press and hold F5, F6, F7, or F8.
- To purge a snapshot, hold down Ctrl+Shift (Windows) or Command+Shift (Mac OS) and press F5, F6, F7, or F8.
- To free all memory used to store snapshots, choose Edit > Purge > Snapshot.

Preview on an external video monitor

You can preview the contents of your Layer, Footage, or Composition panel on an external video monitor. Previewing on a video monitor requires additional hardware, such as a video capture card or a FireWire port.

Previews can be displayed on a second monitor connected to your video display card, such as via DVI, DisplayPort, or HDMI. If you are using a video capture card to connect an external video monitor, install the appropriate drivers and connect the monitor to view previews. If you are using a FireWire port, first connect a digital camcorder or similar device to the port; then connect the video monitor to the device. For more information on setting up FireWire previews, see the documentation for your digital camcorder, VCR, or other devices.

1 Choose **Edit > Preferences > Video Preview (Windows)** or **After Effects > Preferences > Video Preview (Mac OS)**.

2 To enable video output to an external device, choose from the following options:

- **Adobe DV**: This is the FireWire option.
- **Adobe Monitor x:** These are your attached computer monitors that can receive video preview data through the graphics card.
- **Third-party video hardware:** These entries differ depending on what third-party hardware you have connected. **AJA Kona 3G**, **Blackmagic Playback**, and **Matrox Player** are typical examples.

3 Choose **Disable video output when in the Background** option to prevent video frames from being sent to the external monitor when After Effects is not the foreground application.

4 Choose the **Video preview during render queue output** option to send video frames to the external monitor when After Effects is rendering frames in the render queue.

The video preview sent to an external monitor using Mercury Transmit is color-managed (treating the external video preview monitor as an HDTV Rec. 709 device). For more information, see the Video preview with Mercury Transmitarticle.

Note:

*The **Wireframe** preview mode does not preview at all to the video preview monitor. (See Preview modes and Viewer Quality preferencesand Choose a working color space and enable color management.)*

Video preview with Mercury Transmit

Video preview using Mercury Transmit-based system

What is Mercury Transmit?

Mercury Transmit is a software interface that Adobe applications use to send video frames to external video device. Video device manufacturers such as **AJA, BlackMagic Design, Bluefish444**, and **Matrox** provide plug-ins that route the video frames from Mercury Transmit to their hardware.

Video preview using **Mercury Transmit** sends the contents of the **Composition**, **Layer**, or **Footage** panel viewer to an external monitor. The external monitor can be one of the following:

- A video monitor connected through third-party video hardware such as AJA, Blackmagic, or Matrox I/O devices
- A DV device connected over **FireWire**
- A computer monitor connected to your video display card via such as **HDMI,DVI, VGA**, or **DisplayPort**

The setting of the **Resolution** menu in the **Composition** panel determines the resolution for the external video preview.

Note:

*Mercury Transmit does not send overlays such as user interface controls, guides, warning banners and other items drawn by OpenGL to the external monitor. This also means that **Fast Draft** and **Wireframe** preview modes do not send image data to the external monitor.*

Video preview preferences

You can set the following video preview preferences by choosing **Preferences > Video Preview**:

- **Enable Mercury Transmit:** Toggle video preview with **Mercury Transmit**. Use the '/' on the numeric keypad to toggle this option. On a Mac computer without a numeric keypad, use Control+Shift+/ on the main keyboard.
- **Video Device:** Check the box next to any option that appears here to enable video output to the specified device.
  - **Adobe DV:** Select this option for DV devices connected via FireWire.
  - **Adobe Monitor x:** View the list of the attached computer monitors that can receive video preview data through the graphics card.
  - **Third-party video hardware**: View the list of third-party hardware that you have connected, for example, **AJA Kona 3G**, **Blackmagic Playback,** and **Matrox Player**. Click **Setup** to view the options available for each hardware.
- **Disable video output when in the Background**: Select this option to prevent sending video frames to the external monitor when After Effects is not the foreground application.
- **Video preview during render queue output:** Select this option to send video frames to the external monitor when After Effects is rendering frames in the render queue.

If you are previewing an image that does not exactly match the preview monitor's pixel dimensions, the third-party I/O device scales the image. The manner of scaling differs between devices and is in some cases controllable through the **Setup** options for the device. The setting of the **Resolution** menu in the **Composition** panel determines the resolution for the external video preview.

If you experience slow RAM preview frame rates when Mercury Transmit is enabled, try one or more of the following:

- Reduce the resolution in the Composition or Preview panel
- Reduce the RAM preview frame rate in the Preview panel
- Reduce the project color depth to 16-bpc or 8-bpc
- Disable color management (set the project's working space to None).

Tim Kurkoski's blog contains more information about Mercury Transmit.

Modifying and using views

Choose a view layout and share view settings

The Composition panel can show one, two, or four views at a time. By default, viewer options (such as grids and rulers) affect only the currently active view.

- To choose a view layout, choose an option from the Select View Layout menu at the bottom of the Composition panel.
- To scroll through view layouts, place the pointer over the Select View Layout menu and roll the mouse wheel.
- To apply view settings to all views in the current layout, choose Share View Options from the Select View Layout menu. Hold Ctrl (Windows) or Command (Mac OS) to temporarily reverse this behavior.

To activate a view without affecting the selection of layers in a composition, use the middle mouse button to click within the view's pane in the Composition panel.

Choose a 3D view

You can view your 3D layers from several angles, using orthographic views, custom views that employ perspective, or camera views.

The *working 3D views* include the custom views and the fixed orthographic views (Front, Left, Top, Back, Right, or Bottom). The orthographic views show layer positions in the composition but do not show perspective. The working 3D views are not associated with a camera layer. The working 3D views are useful for placing and previewing elements in a 3D scene. 3D layers appear in working 3D views; 2D layers do not appear in working 3D views.

Note:

The Composition panel displays a label within each view (such as Top or Right) to indicate which view is associated with which camera perspective. To hide these labels, choose Show 3D Labels from the Composition panel menu.

You can adjust the point of view and direction of view for the custom views with the Camera tools, or you can look at selected layers or all layers. (See Adjust a 3D view or move a camera, light, or point of interest.)

- Choose a view from the 3D View menu at the bottom of the Composition panel.
- Choose View > Switch 3D View, and choose a view from the menu.
- Choose View > Switch To Last 3D View.
- To switch to the previous 3D view, press Esc.
- To choose one of the 3D views with keyboard shortcuts, press F10, F11, or F12.

To change which 3D view is assigned to a keyboard shortcut, switch to a view and then press Shift and the keyboard shortcut. For example, to make F12 the shortcut for Top view, switch to Top view and then press Shift+F12. You can also use the View > Assign Shortcut To menu command for this purpose.

Show or hide layer controls in the Composition panel

You can assign different options to each view in the Composition panel, so that you can see any combination of camera and light wireframes, layer handles, mask and shape paths, effect control points, and motion path controls.

- To choose which layer controls to show in a view, choose View > View Options, or press Ctrl+Alt+U (Windows) or Command+Option+U (Mac OS).
- To show or hide layer controls in a view, choose View > Show Layer Controls, or press Ctrl+Shift+H (Windows) or Command+Shift+H (Mac OS). This command also shows or hides the 3D reference axes.
- To show or hide mask paths and shape paths in a view, click the Toggle Mask And Shape Path Visibility button at the bottom of the Composition panel.

Zoom an image for preview

Note:

For information on scaling a layer, not just zooming in or out of the preview image, see Scale or flip a layer.

The Magnification Ratio control in the lower-left corner of a Composition, Layer, or Footage panel shows and controls the current magnification. By default, the magnification is set to fit the current size of the panel. When you change magnification, you change the appearance of the preview in the panel that you are previewing, not the actual resolution and pixels of the composition.

The quality of zooming for previews can be set using the Zoom Quality preference. (See Viewer Quality preferences.)

Note:

After Effects renders vector objects before zooming (scaling for preview), so some vector objects may appear jagged when you zoom in on them. This apparent pixelation for zooms does not affect scaling of layers or rendering to final output.

- To zoom in to or out from the center of the active view, press the period (.) key or the comma (,) key. Each keypress additionally increases or decreases the magnification.
- To zoom in to or out from the center of the view using the mouse scroll wheel, place the pointer over the panel and move the scroll wheel.
- To zoom in on or out from a specific point using the mouse scroll wheel, place the pointer over the panel and hold Alt (Windows) or Option (Mac OS) as you move the scroll wheel.
- To zoom in on a specific point using the Zoom tool , click the area in the panel you want to magnify. Each click additionally magnifies the image, centering the display on the point you click. You can also drag the tool to magnify a specific area.
- To zoom out from a specific point using the Zoom tool, Alt-click (Windows) or Option-click (Mac OS) the point that you want to be the center of the zoomed-out view. Each click additionally decreases the magnification of the image, centering the display on the point you click.
- To zoom the active view to 100%, double-click the Zoom tool button in the Tools panel.
- To zoom to fit or to zoom to a preset magnification, choose a zoom level from the Magnification Ratio menu. To change the magnification of all views in a Composition panel, hold Ctrl (Windows) or Command (Mac OS) while choosing a zoom level from the menu. Choose Fit to make the image fit the Composition panel; choose Fit Up To 100% to limit the zoom level to 100%.

To pan around in the Composition, Layer, or Footage panel while zoomed in, drag with the Hand tool, which you can activate by holding down the spacebar, the H key, or the middle mouse button. Hold Shift, too, to pan faster.

For additional ways to zoom and scroll using the mouse scroll wheel, see Scroll or zoom with the mouse wheel.

Resolution

In the context of printing and other media with fixed linear dimensions, *resolution* refers to linear pixel density: the number of pixels or dots in a certain span, expressed in such terms as *ppi* (pixels per inch) and *dpi* (dots per inch).

In video, film, and computer graphics contexts, the linear measurements of the images are variable, so it doesn't make sense to refer to the number of pixels per inch or any other linear measure. Consider, for example, that the same 640x480 movie can be shown on the tiny screen of a mobile device, the monitor of a desktop computer, and a huge motion billboard. The number of pixels per inch is different for each of these presentation devices, even though the number of pixels may be the same.

In this context, the term *resolution* refers to a relative quantity: a ratio of the number of pixels that are rendered to the number of pixels in a source image. For each view, there are two such ratios—one for the horizontal dimension and one for the vertical dimension.

Each composition has its own Resolution setting, which affects the image quality of the composition when it's rendered for previews and final output. Rendering time and memory for each frame are roughly proportional to the number of pixels being rendered.

When you render a composition for final output, you can use the current Resolution settings for the composition or set a resolution value in the Render Settings dialog box that overrides the composition settings. (See Render settings.)

You can choose from the following Resolution settings in the Composition Settings (Composition > Composition Settings) dialog box or from the Resolution/Down Sample Factor menu at the bottom of the Composition panel:

Auto (available only for previews) Adapts the resolution of the view in the Composition panel to render only the pixels necessary to preview the composition at the current zoom level. For example, if the view is zoomed out to 25%, then the resolution automatically adapts to a value of 1/4—shown as (Quarter)—as if you had manually chosen Quarter. If a panel contains multiple views, the resolution adapts to the view with the highest zoom level. This setting gives the best image quality while also avoiding rendering pixels unnecessary for the current zoom level.

Note:

The Auto setting is ignored for compositions for which the Advanced composition setting Preserve Resolution When Nested is selected.

Full Renders each pixel in a composition. This setting gives the best image quality, but takes the longest to render.

Half Renders one-quarter of the pixels contained in the full-resolution image—half the columns and half the rows.

Third Renders one-ninth of the pixels contained in the full-resolution image.

Quarter Renders one-sixteenth of the pixels contained in the full-resolution image.

Custom Renders the image at the horizontal and vertical resolutions that you specify.

Note:

The resolution (down-sample factor) of a Layer viewer is tied to the resolution of the Composition viewer for the composition in which the layer is contained.

View a color channel or alpha channel

You can view red, green, blue, and alpha channels—together or separately—in a Footage, Layer, or Composition panel by clicking the Show Channel button at the bottom of the panel and choosing from the menu. When you view a single color channel, the image appears as a grayscale image, with the color value of each pixel mapped to a scale from black (0 value for the color) to white (maximum value for the color).

To see color values displayed in the channel's own color instead of white, choose Colorize from the Show Channel menu.

When you preview the alpha channel, the image appears as a grayscale image, with the transparency value of each pixel mapped to a scale from black (completely transparent) to white (completely opaque).

Note:

When you choose RGB Straight, which shows straight RGB values before they are matted (premultiplied) with the alpha channel, pixels with complete transparency are undefined and therefore may contain unexpected colors.

You can view other channel values, such as saturation and hue, by applying the Channel Combiner effect and choosing Lightness from the To menu.

To switch between showing the alpha channel and showing all RGB channels, Alt-click (Windows) or Option-click (Mac OS) the Show Channel button.

Alpha Boundary and Alpha Overlay view modes are only available in the Layer panel, and they are intended for use with the Roto Brush effect. For information on these modes, see Layer panel view options.

Adjust exposure for previews

You can adjust the exposure (in f-stop units) for previews with the Adjust Exposure control, which is located to the right of the Reset Exposure button at the bottom of a Composition, Layer, or Footage panel. Each viewer can have its own Adjust Exposure setting.

When the Adjust Exposure control is set to a value other than zero, the Reset Exposure button is blue.

The Adjust Exposure control doesn't affect final output, only how video appears during previews. To make tonal adjustments to a layer that appear in the final output, use the Exposure effect.

The Adjust Exposure control is useful for finding the black point or white point in an image. For example, drag the value control to the right (positive values) until the entire image is white except for one area; that area is the darkest area in the image.

To check the quality of a composite, drag the Adjust Exposure control far to the left and far to the right and look for places where the composited elements differ too much in color or luminance. This technique—sometimes called gamma slamming—is useful for ensuring that a composite will look good and be convincing in contexts other than the one in which you're working. For example, a composite that is adequate in a dark scene may be less convincing when the scene is color-corrected to brighten the scene.

- To adjust exposure for a viewer, drag the Adjust Exposure control to the left or right, or click the control and enter a value in the box.
- To reset exposure, click the Reset Exposure button. To return to the most recent non-zero setting, click the button again.

Safe zones, grids, guides, and rulers

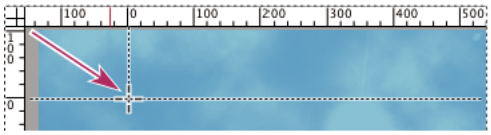
In the Footage, Layer, and Composition panels, you can display safe zone margins, grids, rulers, and guidelines to align and arrange visual elements. After Effects preserves guides when importing Photoshop files saved with guides.

Safe-zone margins, grids, and guides are not rendered, either for the preview options or for final output.

The size of proportional grids increases or decreases when the composition size changes; the size of standard grid squares remains the same regardless of composition size.

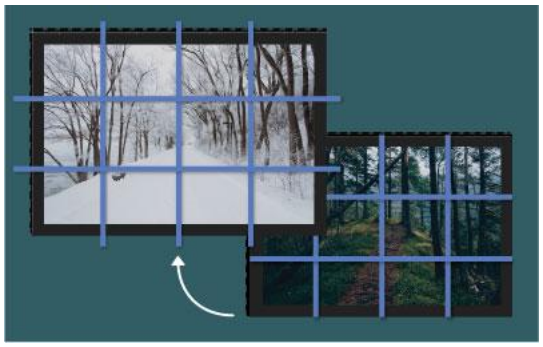
- To change settings for safe-zone margins, grids, and guides, choose Edit > Preferences > Grids & Guides (Windows) or After Effects > Preferences > Grids & Guides (Mac OS).

- To show or hide safe zones, grids, guides, or rulers, click the Grid And Guides Options button and choose the appropriate item, or use a menu command or keyboard shortcut in the View menu.
- To toggle between showing and hiding the safe zones, Alt-click (Windows) or Option-click (Mac OS) the Grid And Guide Options button.
- To make layer edges and mask edges snap to grids or guides, choose View > Snap To Grid or View > Snap To Guides.
- To create a guide line, drag from either ruler.
- To delete a guide line, drag it to a ruler using the Selection tool.
- To delete all guide lines, choose View > Clear Guides.
- To move a guide line, drag it using the Selection tool.
- To lock or unlock guides, choose View > Lock Guides. Locking a guide prevents it from being accidentally moved.
- To set the zero point (origin) for the rulers, drag the crosshair from the intersection of the two rulers (in the upper-left corner) into the image area. Reset the zero point by double-clicking the intersection of the rulers. The position of the pointer measured from the new zero point is shown in the Info panel as X' and Y' coordinates.



Dragging the zero-point crosshair

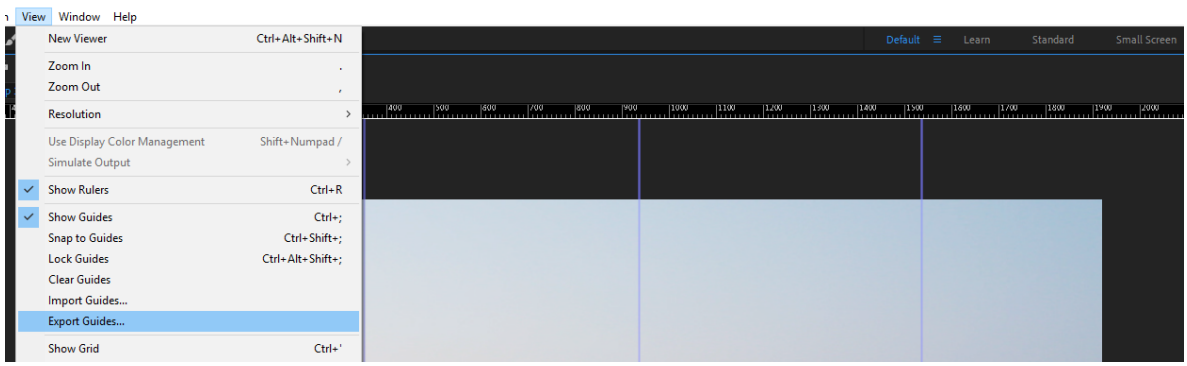
Import and export guides



Export guides to other compositions and layers

After Effects enables you to save guide lines and import them into other ae comps, projects, and layers. You can also export these guides to Premiere Pro, where the editors can use them to maintain consistency in projects.

To import exiting guides into After Effects, select **View > Import Guides**. To export guides, select **View > Export Guides**.



Select Export Guide

When you export guides, it creates a template file (.guides) that you can share or import into a different project, or a different composition, layer, or footage view in the same project. A guides template file contains JSON data that records the guide attributes. After Effects exports all guides in the current view. Importing guides adds the guides to the current view. It retains any existing guides in the view.

You can import After Effects guides into Premiere Pro 13.1 and import Premiere Pro guides into After Effects. Note, After Effects does not support all the guides functionality that Premiere Pro allows, such as individual guide colors. When you import a guide template created in Premiere Pro:

- Guide colors change to the color defined in **Preferences > Grids & Guides**.
- Guides defined either by percentage or pinned to the opposite side (right or bottom) are placed at the appropriate pixel value for the current viewer, but are not percentage-based or pinned if the composition, layer, or footage dimensions change.

For more information, see Use rulers and guides in the Program Monitor.

About title-safe and action-safe zones

Television sets enlarge a video image and allow some portion of its outer edges to be cut off by the edge of the screen. This kind of cropping is known as overscan. The amount of overscan is not consistent between television sets, so you should keep important parts of a video image within certain margins, in areas known as safe zones. Safe-zone margins represent the percentage of image dimensions not included in the safe zone. You should always design from one edge of the frame to the other, because computer monitors and some television sets may show the entire frame.

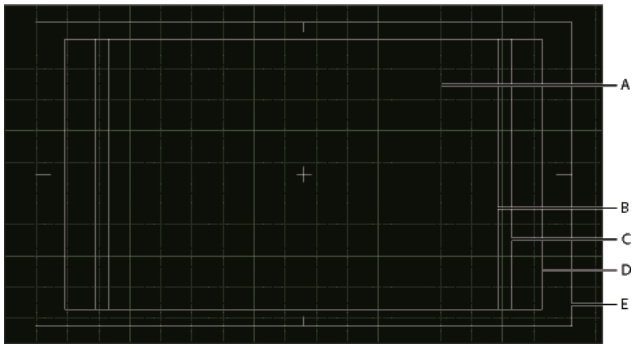
The conventional action-safe zone is 90% of the width and height of the frame, which corresponds to a margin of 5% on each side. Keep important visual elements within this zone.

The conventional title-safe zone is 80% of the width and height of the frame, which corresponds to a margin of 10% on each side. Keep text that you intend for the audience to read within this zone.

Compositions with a frame aspect ratio equal to or near 16:9 have two additional center-cut safe-zone indicators. The center-cut indicators show which parts of a 16:9 composition may be cut off when the image is shown on a 4:3 display. Such cropping is a concern when creating images for high-definition displays that may also be shown on standard-definition television sets. By default, the center-cut action-safe margin is 32.5% (16.25% on each side), and the center-cut title-safe margin is 40% (20% on each side).

Note:

The center-cut safe-zone margins are only shown if the frame aspect ratio for the composition is equal to or near 16:9.



Safe zones and grids in the Composition panel
***A** Grid **B** Center-cut title-safe zone **C** Center-cut action-safe zone **D** Title-safe zone **E** Action-safe zone*

Aharon Rabinowitz provides a video tutorial in the Multimedia 101 series on the Creative COW website that explains safe zones.

Additional resources for viewing and previewing

When you want to view certain crucial frames in a composition—such as when showing them to a client for interim approval—you may want to create a contact sheet. Jeff Almasol provides a script that creates a contact sheet that consists of a grid of specific individual frames from a composition. You specify which frames to show by setting layer markers. For more information, go to Jeff Almasol's redefinery website.

Chapter 6: Layers and properties

Creating layers

Layers overview

Layers are the elements that make up a composition. Without layers, a composition is only an empty frame. Use as many layers as necessary to create your composition. Some compositions contain thousands of layers, whereas some compositions contain only one layer.

Layers in After Effects are similar to tracks in Adobe Premiere Pro. The primary difference is that each After Effects layer can have no more than one footage item as its source, whereas a Premiere Pro track typically contains multiple clips. Layers in After Effects are also similar to layers in Photoshop, though the interface for working with layers differs. Working with layers in the Timeline panel in After Effects is similar to working with layers in the Layers panel in Photoshop.

You can create several kinds of layers:

- Video and audio layers that are based on footage items that you import, such as still images, movies, and audio tracks
- Layers that you create within After Effects to perform special functions, such as cameras, lights, adjustment layers, and null objects
- Solid-color layers that are based on solid-color footage items that you create within After Effects
- Synthetic layers that hold visual elements that you create within After Effects, such as shape layers and text layers
- Precomposition layers, which use compositions as their source footage items

When you modify a layer, you do not affect its source footage item. You can use the same footage item as the source for more than one layer and use the footage differently in each instance. (See Importing and interpreting footage items.)

Changes made to one layer do not affect other layers, unless you specifically link the layers. For example, you can move, rotate, and draw masks for one layer without disturbing any other layers in the composition.

After Effects automatically numbers all layers in a composition. By default, these numbers are visible in the Timeline panel next to the layer name. The number corresponds to the position of that layer in the stacking order. When the stacking order changes, After Effects changes all numbers accordingly. The layer stacking order affects rendering order and therefore affects how the composition is rendered for previews and final output. (See Render order and collapsing transformations.)

Layers in the Layer, Composition, and Timeline panels

After you add a layer to a composition, you can reposition the layer in the Composition panel. In the Timeline panel, you can change a layer's duration, starting time, and place in the layer stacking order. You can also change any of the properties of a layer in the Timeline panel. (See Layer properties in the Timeline panel.)

You can perform many tasks—such as drawing masks—in either the Composition panel or the Layer panel. However, other tasks—such as tracking motion and using the paint tools—must be performed in the Layer panel.

The Layer panel shows you a layer before any transforms are applied to the layer. For example, the Layer panel does not show the result of modifying the Scale property of a layer. To see a layer in context with other layers and with the results of transforms, use the Composition panel.

Layers that are not based on a source footage item are synthetic layers. Synthetic layers include text layers and shape layers. You cannot open a synthetic layer in the Layer panel. You can, however, precompose a synthetic layer and open the precomposition in the Layer panel.

To view changes to a layer (such as masks or effects) in the Layer panel, select Render in the Layer panel. Deselect Render to view the original, unaltered layer.

Opening layers and layer sources

- To open a layer other than a precomposition layer in the Layer panel, double-click the layer, or select the layer and choose Layer > Open Layer.
- To open the source composition of a precomposition layer in the Composition panel, double-click the layer, or select the layer and choose Layer > Open Composition.
- To open the source footage item of a layer, Alt-double-click (Windows) or Option-double-click (Mac OS) the layer, or select the layer and choose Layer > Open Layer Source.

If you right-click (Windows) or Control-click (Mac OS) a layer, you can choose Open Footage or Open Composition to open the layer's source item.

- To open a precomposition layer in the Layer panel, Alt-double-click (Windows) or Option-double-click (Mac OS) the layer, or select the layer and choose Layer > Open Layer.

Create layers from footage items or change layer source

You can create a layer from any footage item in the Project panel, including another composition. After you add a footage item to a composition, you can modify and animate the resulting layer.

When you add a composition to another composition, you create a layer that uses the composition that you added as its source. (See Precomposing, nesting, and pre-rendering.)

The Still Footage preference setting (Preferences > Import) controls the default duration of layers that use still footage items as their sources. By default, when you create a layer with a still image as its source, the duration of the layer is the duration of the composition. You can change the duration of the layer after it's created by trimming the layer.

Note:

By default, new layers begin at the beginning of the composition duration. You can instead choose to have new layers begin at the current time by deselecting the Create Layers At Composition Start Time preference (Edit > Preferences > General (Windows) or After Effects > Preferences > General (Mac OS)).

Often, the next step after adding a layer to a composition is scaling and positioning the layer to fit in the frame. (See Scale or flip a layer.)

Create layers from one or more footage items

When you create layers from multiple footage items, the layers appear in the layer stacking order in the Timeline panel in the order in which they were selected in the Project panel.

1 Select one or more footage items and folders in the Project panel.

2 Do one of the following:

- Drag the selected footage items to the Composition panel.

Hold Shift while dragging to snap the layer to the center or edges of the composition.

- Drag the selected footage items to the Timeline panel. When you drag the item into the layer outline, a highlight bar indicates the layer appearence when you release the mouse button. If you drag the item over the time graph area, a time marker indicates the position of the In point of the layer when you release the mouse button.

Hold Shift while dragging to snap the In point to the current-time indicator.

- Drag the selected footage items to the composition name or icon in the Project panel, or press Ctrl+/ (Windows) or Command+/ (Mac OS). New layers are created immediately above a selected layer and at the center of the composition. If no layer is selected, then new layers are created at the top of the layer stack.

Create a layer from a trimmed footage item

You can trim a moving-image footage item in the Footage panel before inserting a layer based on that footage item into a composition.

1 Double-click a footage item in the Project panel to open it in the Footage panel. (See View footage items in the Footage panel.)

2 Move the current-time indicator in the Footage panel to the frame that you want to use as the In point of the layer, and click the Set In Point button at the bottom of the Footage panel.

3 Move the current-time indicator in the Footage panel to the frame that you want to use as the Out point of the layer, and click the Set Out Point button at the bottom of the Footage panel.

4 To create a layer based on this trimmed footage item, click an Edit button at the bottom of the Footage panel:

Overlay Edit

Creates the layer at the top of the layer stacking order, with the In point set at the current time in the Timeline panel.

Ripple Insert Edit

Also creates the layer at the top of the layer stacking order, with the In point set at the current time in the Timeline panel, but splits all other layers. Newly created split layers are moved later in time so that their In points are at the same time as the Out point of the inserted layer.

Replace layer sources with references to another footage item

1 Select one or more layers in the Timeline panel

2 Alt-drag (Windows) or Option-drag (Mac OS) a footage item from the Project panel onto a selected layer in the Timeline panel.

Solid-color layers and solid-color footage items

You can create layers of any solid color and any size (up to 30,000x30,000 pixels). Solid-color layers have solid-color footage items as their sources. Solid-color layers and solid-color footage items are both usually called solids.

Solids work just like any other footage item: You can add masks, modify transform properties, and apply effects to a layer that has a solid as its source footage item. Use solids to color a background, as the basis of a control layer for a compound effect, or to create simple graphic images.

Solid-color footage items are automatically stored in the Solids folder in the Project panel.

To learn how to modify solids folder for better project organization, see Working with footage items.

Jeff Almasol provides a script on his redefinery website with which you can rename the selected solid footage items in the Project panel. You can use this script to, for example, include the pixel dimensions, aspect ratio, and RGB color values in the name.

Note:

In After Effects CS6 and later, new solid layers are 17% gray (45/255) so they can contrast with the new default darker user interface brightness

Create a solid-color layer or solid-color footage item

- To create a solid footage item but not create a layer for it in a composition, choose File > Import > Solid.
- To create a solid footage item and create a layer for it in the current composition, choose Layer > New > Solid or press Ctrl+Y (Windows) or Command+Y (Mac OS).

  To create a layer that fits the composition when you create a solid-color layer, choose Make Comp Size.

Modify settings for solid-color layers and solid-color footage items

- To modify settings for the selected solid-color layer or footage item, choose Layer > Solid Settings.

  To apply the changes to all solid-color layers that use the footage item, select Affect All Layers That Use This Solid. If you don't select this option, you create a footage item, which becomes the source for the selected layer.

Adjustment layers

When you apply an effect to a layer, the effect applies only to that layer and no others. However, an effect can exist independently if you create an *adjustment layer* for it. Any effects applied to an adjustment layer affect all layers below it in the layer stacking order. An adjustment layer at the bottom of the layer stacking order has no visible result.

Because effects on adjustment layers apply to all layers beneath them, they are useful for applying effects to many layers at once. In other respects, an adjustment layer behaves like other layers; for example, you can use keyframes or expressions with any adjustment layer property.

Note:

A more accurate description is that the adjustment layer applies the effect to the composite created from all layers below the adjustment layer in the layer stacking order. For this reason, applying an effect to an adjustment layer improves rendering performance compared with applying the same effect separately to each of the underlying layers.

If you want to apply an effect or transformation to a collection of layers, you can precompose the layers and then apply the effect or transformation to the precomposition layer. (See Precompose layers.)

Use masks on an adjustment layer to apply an effect to only parts of the underlying layers. You can animate masks to follow moving subjects in the underlying layers.

- To create an adjustment layer, choose Layer > New > Adjustment Layer, or press Ctrl+Alt+Y (Windows) or Command+Option+Y (Mac OS).
- To convert selected layers to adjustment layers, select the Adjustment Layer switch for the layers in the Timeline panel or choose Layer > Switches > Adjustment Layer.

Note:

You can deselect the Adjustment Layer switch for a layer to convert it to a normal layer.

Online resources about adjustment layers

Andrew Kramer provides a video tutorial on his Video Copilot website in which he shows how to use an adjustment layer to apply an effect to only a short duration and to only specific portions of a movie.

Eran Stern provides a video tutorial on the Creative COW website that demonstrates the use of lights as adjustment layers, to precisely control which layers are affected by which lights.

Lloyd Alvarez provides a script on his After Effects Scripts website that creates an adjustment layer above each selected layer, with each new adjustment layer trimmed to the duration of the selected layer.

Create a layer and new Photoshop footage item

When you create an Adobe Photoshop file from After Effects, Photoshop starts and creates a PSD file. This PSD file consists of a blank Photoshop layer that has the same dimensions as your composition, with the appropriate title-safe, and action-safe guides. The color bit depth of the PSD file is the same as the color bit depth of your After Effects project.

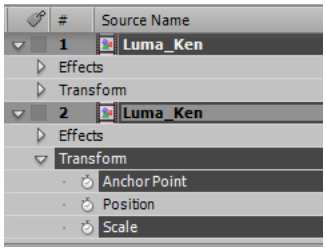
The newly created PSD file is automatically imported into After Effects as a footage item. Any changes that you save in Photoshop appear in the footage item in After Effects.

- To create a Photoshop footage item and use it as the source for a new layer in the current composition, choose Layer > New > Adobe Photoshop File. The Photoshop layer is added as the top layer in your composition.
- To create a Photoshop footage item with the settings of the most recently open composition, without adding it to a composition, choose File > New > Adobe Photoshop File.

Selecting and arranging layers

Select layers

Selected layers that also have properties selected are indicated with a hollow highlight in the Timeline panel. A selected layer that has no properties selected is indicated with a solid highlight.



Top layer selected, but no properties selected; bottom layer selected with properties selected.

To scroll the topmost selected layer to the top of the Timeline panel, press X.

- To select a layer, click the layer in the Composition panel, click its name or duration bar in the Timeline panel, or click its name in the Flowchart panel.
- To select a layer that is obscured in the Composition panel, right-click (Windows) or Control-click (Mac OS) over the layer in the Composition panel, and choose Select > [layer name].
- To select a layer if the layer is open in its own Layer panel, choose the layer name from the Window menu or the Layer panel viewer menu.
- To select a layer by position number, type the layer number on the numeric keypad. If the layer number has more than one digit, type the digits quickly so that After Effects can recognize them as one number.
- To select the next layer in the stacking order, press Ctrl+Down Arrow (Windows) or Command+Down Arrow (Mac OS). To select the previous layer, press Ctrl+Up Arrow (Windows) or Command+Up Arrow (Mac OS).
- To extend the selection to the next layer in the stacking order, press Ctrl+Shift+Down Arrow (Windows) or Command+Shift+Down Arrow (Mac OS). To extend the selection to the previous layer in the stacking order, press Ctrl+Shift+Up Arrow (Windows) or Command+Shift+Up Arrow (Mac OS).
- To select all layers, choose Edit > Select All while the Timeline or Composition panel is active. To deselect all layers, choose Edit > Deselect All. If the composition's Hide Shy Layers switch is selected, using Select All when the Timeline panel is active doesn't select shy layers. (See Show and hide layers in the Timeline panel.)
- To deselect any currently selected layers and select all other layers; with at least one layer selected, choose Invert Selection from the context menu in the Composition or Timeline panel.
- To select all layers that use the same color label, click the color label in the Timeline panel, and choose Select Label Group, or select a layer with that color label and choose Edit > Label > Select Label Group.
- To select all child layers assigned to a parent layer, select the parent layer and choose Select Children from the context menu in the Composition or Timeline panel. The child layers are added to the existing selection.
- You can select multiple layers in the Composition panel . Drag with the Selection tool to create a selection box (marquee) around the layers to select them. Hold Shift while clicking or dragging to select additional layers or to deselect layers.

Lloyd Alvarez provides a script on his After Effects Scripts website with which you can tag layers and then select, shy, and solo layers according to their tags. The tags are appended to comments in the Comments field in the Timeline panel.

Change the stacking order for selected layers

The vertical arrangement of layers in the Timeline panel is the layer stacking order, which is directly related to the render order. You can change the order in which layers are composed with one another by changing the layer stacking order.

Note:

Because of their depth properties, the stacking order of 3D layers in the Timeline panel does not necessarily indicate their spatial position in the composition.

- In the Timeline panel, drag the layer names to a new position in the layer stacking order.
- To move the selected layers up one level in the layer stacking order, press Ctrl+Alt+Up Arrow (Windows) or Command+Option+Up Arrow (Mac OS); to move the selected layers down one level, press Ctrl+Alt+Down Arrow (Windows) or Command+Option+Down Arrow (Mac OS).
- To move the selected layers to the top of the layer stacking order, press Ctrl+Alt+Shift+Up Arrow (Windows) or Command+Option+Shift+Up Arrow (Mac OS); to move the selected layers to the bottom, press Ctrl+Alt+Shift+Down Arrow (Windows) or Command+Option+Shift+Down Arrow (Mac OS).
- Choose Layer > Arrange, and then choose Bring Layer Forward, Send Layer Backward, Bring Layer To Front, or Send Layer To Back.

When you copy (or cut) and paste layers, the layers are pasted so that they appear from top to bottom in the Timeline panel in the same order in which they were selected before the copy (or cut) operation. You can Ctrl-click (Windows) or Command-click (Mac OS) layers to select them in any arbitrary order, cut them, and then immediately paste them to reorder the layers in the order in which they were selected.

Jeff Almasol provides a script on his redefinery website with which you can change the stacking order of layers in a composition by sorting according to In point, Out point, selection order, layer name, or random order.

Coordinate systems: composition space and layer space

The coordinate system for each layer is its *layer space*. The coordinate system for each composition is its *composition space*. Property values for items that exist within a layer—such as effect control points and anchor points—exist in layer space and are measured from the origin in the layer space of that layer. The Position property of a layer, however, describes where the layer is within a composition and is therefore measured in the composition space of that composition.

As you move the pointer over the layer frame in the Layer panel, the Info panel displays the coordinates of the pixel under the pointer in layer space. The X coordinate represents position on the horizontal axis, and the Y coordinate represents position on the vertical axis. Values for these coordinates are in pixels. The X and Y coordinates are relative to the origin (0,0), which is fixed at the upper left corner of the layer.

You can modify the zero point of the rulers, but you can't modify the origin of layer space. If the zero point differs from the origin, X' and Y' coordinates appear in the Info panel below the X and Y coordinates, indicating coordinates based on the zero point of the rulers.

When you move the pointer over the composition frame in the Composition panel, the Info panel displays coordinates in composition space. As you drag a layer, the lower portion of the Info panel displays the coordinates of the anchor point of the layer.

Move layers in space

When you move a layer in space, you modify its Position property.

You can separate the components of a Position property into individual properties—X Position, Y Position, and (for 3D layers) Z Position—so that you can modify or animate each independently. (See Separate dimensions of Position to animate components individually.)

Jeff Almasol provides a script on his redefinery website that places a new null layer on the line between the anchor points of two selected layers; you use a slider control on the null layer to reposition the null layer along this line.

To move selected layers so that their anchor points are at the center in the current view, choose Layer > Transform > Center In View or press Ctrl+Home (Windows) or Command+Home (Mac OS).

To move a layer so that its anchor point is at the center of the composition, right-click (Windows) or Control-click (Mac OS) the Position property, choose Edit Value, choose % Of Composition in the Units menu, and enter 50 for each of the components of the Position property.

To avoid softening of an image that is not moving, make sure that a layer's Position values are non-fractional values. This avoids resampling that is used when a layer with image quality set to Best is placed on subpixels.

Move layers by dragging in the Composition panel

To snap the edges of a layer to grids or guides as you drag, choose View > Snap To Grid or View > Snap To Guides.

- Select one or more layers, and then drag a selected layer using the Selection tool .

  When you move a layer by dragging it in the Composition panel, the Info panel shows the change in the Position property as you drag.

Move layers by directly modifying the Position property

1. Select one or more layers.
2. Press P to show the Position property in the Timeline panel.
3. Modify the Position property in the Timeline panel.

Move layers with arrow keys

1. Select one or more layers.
2. To move selected layers one pixel left, right, up, or down, press an arrow key. To move 10 pixels, hold Shift as you press the arrow key.

   The arrow keys move the layer one pixel at the current magnification. To move a layer more precisely with the arrow keys, zoom in the Composition panel. (See Zoom an image for preview.)

Separate dimensions of Position to animate components individually

By default, each Position property has two or three components, with each holding the value for one of the spatial dimensions (axes). You can separate the components of a Position property into individual properties—X Position, Y Position, and (for 3D layers) Z Position. Separating dimensions allows you to modify or animate the position of a layer along the x axis, y axis, and z axis independently.

To decompose selected Position properties into individual X Position, Y Position, and (for 3D layers) Z Position properties, do one of the following:

- Choose Animation > Separate Dimensions.
- Right-click (Windows) or Control-click (Mac OS) a Position property and choose Separate Dimensions from the context menu.
- Click the Separate Dimensions button at the bottom of the Graph Editor.

To recompose a set of individual Position properties into a single Position property with multiple components, use the same commands that you use to separate dimensions.

Note:

When you recompose separate Position properties into a single Position property, some information about the motion path and speed is lost, because the multiple Bezier curves used to represent the individual components are collapsed into a single Bezier curve at each keyframe. When you separate dimensions, some information about speed is lost, but the motion path does not change. You should work with separate dimensions or without separate dimensions for each property for an entire project, rather than toggling back and forth.

The decision of whether to work with separate dimensions depends on what you're trying to accomplish. Using one property for position has the advantage of providing smooth motion more easily. Also, using a single property for position enables the use of roving keyframes, which provides uniform speed. Working with separate dimensions for position sacrifices some of this automatic smoothing to gain greater control of spatial animation. Working with separate dimensions also makes some simulations easier, especially in cases in which the simulated forces acting on a layer are orthogonal (perpendicular) to one another.

For example, if you are animating a ball flying horizontally and bouncing vertically, you can do so more easily by separating dimensions. The X Position property can be animated with two keyframes, one for the start position and one for the end position. This horizontal animation represents the speed of the throw. The Y Position property can be animated with a single expression that simulates the acceleration due to gravity and the vertical bouncing from the floor. A similar example is a boat drifting down a river in a variable crosswind.

Note:

After Effects CS3 included a Separate XYZ Position animation preset that accomplished something similar to the Separate Dimensions feature, though the animation preset is not as robust.

Align or distribute layers in 2D space

Use the Align panel to line up or evenly space selected layers. You can align or distribute layers vertically or horizontally.

1. Select the layers to align or distribute.
2. Choose Selection or Composition from the Align Layers To menu.

   Selection Aligns selected layers according to the layer boundaries of the selected layers.

   Composition Aligns selected layers according to the boundaries of the composition frame.

3 In the Align panel, click the button representing the desired type of alignment or distribution.

- To distribute, you must select three or more layers. When Selection is chosen in the Align Layers To menu, you must select two or more layers to align. When Composition is chosen in the Align Layers To menu, you must select one or more layers to align.
- When Selection is chosen in the Align Layers To menu, each alignment option aligns selected layers to the layer that most closely represents the new alignment. For example, for right-edge alignment, all selected layers align to the selected layer with the edge that is farthest to the right.
- A distribution option evenly spaces selected layers between the two most extreme layers. For example, for a vertical distribution option, the selected layers are distributed between the topmost and bottommost selected layers.
- When you distribute layers of different sizes, the spaces between layers may not be uniform. For example, distributing layers by their centers creates equal space between the centers—but different-sized layers extend by different amounts into the space between layers.
- Alignment or distribution options cannot move locked layers.
- The Align panel does not affect alignment of characters within a text layer.

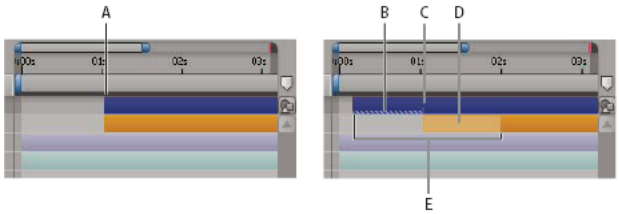
To move selected layers so that their anchor points are at the center in the current view, choose Layer > Transform > Center In View or press Ctrl+Home (Windows) or Command+Home (Mac OS).

Charles Bordenave (nab) provides a script on the After Effects Scripts website, with which you can distribute layers in 3D space.

Trim, extend, or slip-edit a layer

The beginning of the duration of a layer is its *In point*, and the end is its *Out point*. The duration is the span between the In point and the Out point, and the bar that extends from the In point to the Out point is the *layer duration bar*.

To *trim* a layer is to modify its In or Out point so that the layer has a different duration. When you trim a layer that is based on moving source footage, you affect which frames of the source footage item are shown in the layer; the first frame to appear is at the In point, and the last frame to appear is at the Out point. Trimming a layer doesn't cut frames from the footage item; it only affects what frames are played for the layer.



Trimming layers in the Timeline panel
***A** Original In point **B** Negative layer time indicator for still image layer **C** Original In point **D** Slip-edit bar, representing excluded frames for motion footage layer **E** New In points*

When you use a footage item as a source for different layers, you can trim each layer differently to show different portions of the source. Trimming a layer does not alter the footage item or the original source file.

You can trim a layer by changing the In and Out points in the Layer panel or the Timeline panel. (You can also trim a footage item before using it to create a layer. See Create layers from footage items or change layer source.)

The In point , Out point , and duration Δvalues for a layer are shown at the bottom of the Layer panel. To show this information for all layers in the Timeline panel, click the In/Out/Duration/Stretch button in the lower-left corner of the Timeline panel. The duration, In point, and Out point for the selected layer are also shown in the Info panel.

In the Layer panel, In and Out points are expressed in layer time. In the Timeline panel, In and Out points are expressed in composition time. The duration is the same in both cases (unless time-remapping or time-stretching is enabled for the layer).

You can extend many kinds of layers for any duration, extending their In points and Out points out past their original times. This capability applies to time-remapped layers, shape layers, layers based on still-image footage items, camera layers, light layers, and text layers. If you extend a layer back in time so that the layer extends into negative layer time (past layer time zero), a series of hash marks on the bottom of the layer bar indicates the portions of the layer that are in negative layer time. This indication is useful if you've applied effects to the layer—such as Particle Playground or Shatter—that use layer time to calculate their results.

Online resources for trimming, extending, and editing layers

Jeff Almasol provides a script on his redefinery website that creates a panel with controls for moving various combinations of items in time: layer In point, layer Out point, layer source frames, keyframes, and markers.

Trim or extend layers in the Timeline panel

Dragging the Out point of a layer duration bar.

1. Select one or more layers in the Timeline panel.
2. Do one of the following:
   - Drag either end of a layer duration bar.
   - Move the current-time indicator to the time at which you want to set the In point or Out point. To set the In point to the current time, press Alt+[(Windows) or Option+[(Mac OS). To set the Out point to the current time, press Alt+] (Windows) or Option+] (Mac OS).

Trim or extend a layer in the Layer panel

- Open the layer in the Layer panel and drag either end of the layer duration bar.
- Move the current-time indicator in the Layer panel to the time at which you want the footage to begin or end, and then click the In or Out button to set the In or Out point to the current time.

Slip-edit a layer

After you've trimmed a layer based on moving footage, a pale *slip-edit bar* represents the frames of the footage item that you are excluding from the composition. This pale rectangle does not appear for a trimmed layer based on a still footage item. You can choose which frames are played within a trimmed duration by dragging the slip-edit bar. The In and Out points of the layer are not affected.

Moving only the In or Out point of a layer doesn't move keyframes. Dragging the layer duration bar moves all keyframes. Dragging the slip edit bar moves selected keyframes, but does not move unselected keyframes.

When performing a slip edit, you probably want to move some keyframes with the source footage—such as mask keyframes. Other keyframes should stay where they are in time. Press Shift+F2 to deselect keyframes and leave the layer selected.

- Drag the slip-edit bar to the left or right.
- Drag the layer to the left or right with the Pan Behind (Anchor Point) tool.

Remove part of the duration of a layer

1. In the Timeline panel, set the work area to include only the portion of the layers' duration to remove: Move the current-time indicator to the time that the work area is to begin, and press B. Move the current-time indicator to the time at which the work area is to end, and press N.
2. Do one of the following:
   - Select the layers from which to remove a section.
   - Select the Lock switch for layers that you do not want affected by the extraction. Press F2 to deselect all layers.

   Note:

   If no layers are selected, the following step removes the section from all unlocked layers.
3. Do one of the following:
   - To remove the section and leave a gap of the same duration as the removed section, choose Edit > Lift Work Area.
   - To remove the section, choose Edit > Extract Work Area. The gap is closed by ripple deletion.

Place or move a layer in time

The layer duration bar represents the layer duration visually. The In, Out, and Duration columns in the Timeline panel represent the layer duration numerically.

Note:

To choose which columns are visible in the Timeline panel, choose Columns from the panel menu, or right-click (Windows) or Control-click (Mac OS) a column heading.

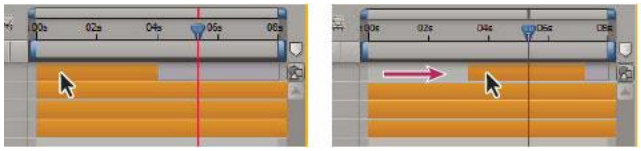
These procedures move the entire layer in time.

- To set the In point or Out point numerically, click the number in the In or Out column for the layer in the Timeline panel.
- To move the In point or Out point to the current time, Alt-click (Windows) or Option-click (Mac OS) the number in the In or Out column for the layer in the Timeline panel.
- To move the In points of selected layers to the beginning of the composition, press Alt+Home (Windows) or Option+Home (Mac OS).
- To move the Out points of selected layers to the end of the composition, press Alt+End (Windows) or Option+End (Mac OS).
- To move selected layers one frame later, press Alt+Page Down (Windows) or Option+Page Down (Mac OS). To move selected layers 10 frames later, press Alt+Shift+Page Down (Windows) or Option+Shift+Page Down (Mac OS).
- To move selected layers one frame earlier, press Alt+Page Up (Windows) or Option+Page Up (Mac OS). To move selected layers 10 frames earlier, press Alt+Shift+Page Up (Windows) or Option+Shift+Page Up (Mac OS).

- To move the entire layer in time by dragging, drag the layer duration bar to the left or right. To snap the layer duration bar to significant points in time (such as markers, or the start or end of the composition), Shift-drag the layer duration bar.

Note:

When you drag a layer in the Timeline panel, the Info panel displays the name, duration, change in time, and In and Out points for the layer.

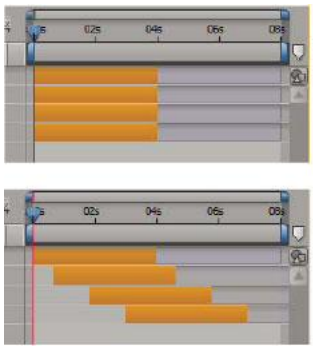


Before and after dragging the duration bar

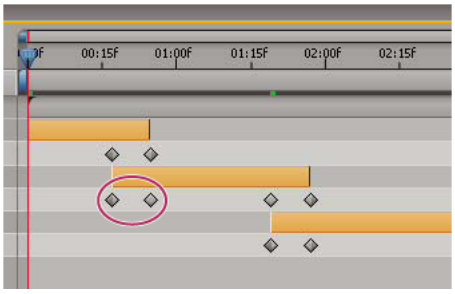
Jeff Almasol provides a script on his redefinery website with which you can move selected layers as a group, aligning the group to a specific time in the composition.

Arrange layers in time sequentially

Use the Sequence Layers keyframe assistant to automatically arrange layers in a sequence. When you apply the keyframe assistant, the first layer you select remains at its initial time, and the other selected layers move to new times in the Timeline panel based on the order in which you selected them.



Layers selected in Timeline panel (top), and layers arranged in sequence by applying the Sequence Layers Keyframe Assistant (bottom)



Overlapping layers can have Opacity keyframes set automatically to create a cross-dissolve.

For a layer to be put into a sequence, its duration must be less than the length of the composition so that it leaves time for other layers. (See Trim, extend, or slip-edit a layer.)

1 In the Timeline panel, hold down Ctrl (Windows) or Command (Mac OS) and select layers in sequential order, beginning with the layer to appear first.

2 Choose Animation > Keyframe Assistant > Sequence Layers.

3 In the Sequence Layers dialog box, do one of the following:

- To arrange the layers end to end, leave the Overlap option unselected.
- To overlap layers, select Overlap, enter a Duration value for the duration of the overlap, and select a transition. Select Cross Dissolve Front And Back Layers to use the transparency of the selected layers; otherwise, choose Dissolve Front Layer.
- To leave gaps between the layers, select Overlap and enter a negative Duration value.

Copy or duplicate a layer

When you copy a layer, you copy all of its properties, including effects, keyframes, expressions, and masks.

Duplicating a layer is a shortcut with which you copy and paste the layer with one command. Duplicating a layer with a track matte preserves the relative ordering of the layer and its track matte.

When you paste layers, they are placed in the order in which you selected them before copying. The first layer selected is the last one to be placed, so it ends up on the top in the layer stacking order. If you select layers from the top first, they end up in the same stacking order when pasted.

If you have a component of a layer—such as a mask or keyframe—selected when you copy, you copy only that component. Before copying, press Shift+F2 to deselect all of the components of a layer and leave the layer itself selected.

- To copy selected layers and place the In points of the copies at the current time, choose Edit > Copy, and then press Ctrl+Alt+V (Windows) or Command+Option+V (Mac OS).
- To copy selected layers and place the copies at the same times as the originals, choose Edit > Copy, and then choose Edit > Paste.

To place copies at the top of the layer stack in the Timeline panel instead of immediately above the originals, press F2 to deselect the originals before you paste.

- To duplicate selected layers, choose Edit > Duplicate or press Ctrl+D (Windows) or Command+D (Mac OS).

Split a layer

In the Timeline panel, you can split a layer at any time, creating two independent layers. Splitting a layer is a time-saving alternative to duplicating and trimming the layer—something you might do when you want to change the stacking-order position of the layer in the middle of the composition.

Note:

To make new split layers appear above the original layer in the Timeline panel, select Create Split Layers Above Original Layer (Edit > Preferences > General (Windows) or After Effects > Preferences> General (Mac OS)). Deselect this option to make the layers appear below the original layer.

1 Select one or more layers.

2 Move the current-time indicator to the time at which to split the layers.

3 Choose Edit > Split Layer.

When you split a layer, both resulting layers contain all of the keyframes that were in the original layer in their original positions. Any applied track mattes retain their order, on top of the layer.

After you split a layer, the duration of the original layer ends at the point of the split, and the new layer starts at that point in time.

If no layer is selected when you choose Edit > Split Layer, all layers are split at the current time.

Paul Tuersley provides a script on the AE Enhancers forum for splitting layers at layer markers.

Lloyd Alvarez provides a script on his After Effects Scripts website that automatically detects edits in a footage layer and splits it into a separate layer for each edit (or places a layer marker at each edit).

Auto-Orientation options

The auto-orientation options (Layer > Transform > Auto-Orient) for each layer specify how its orientation depends on motion paths, points of interest, and cameras.

Off The layer rotates freely, independent of the motion path, point of interest, or other layers.

Orient Along Path The layer faces in the direction of the motion path. For example, use this option for a camera to depict the perspective of a driver who is looking at the road ahead while driving.

Orient Towards Camera The layer is always oriented so that it faces the active camera. This option is available for 3D layers; this option is not available for 2D layers, cameras, or lights. 3D text layers have an additional option, Orient Each Character Independently, which orients each character around its individual anchor point. Selecting Orient Each Character Independently enables per-character 3D properties for the text layer if they aren't already enabled. (See Per-character 3D text properties.)

Orient Towards Point Of Interest The camera or light always points at its point of interest. This option is not available for layers other than cameras and lights. (See Cameras, lights, and points of interest.)

Note:

If you specify an auto-orientation option for a layer, and then change its Orientation or X, Y, or Z Rotation properties, the layer orientation is offset by the new values. For example, you can set a camera with Orient Along Path, and then rotate the camera 90 degrees to the right to depict the perspective of a passenger looking out the side window of a car as it moves.

The automatic orientation to point to the point of interest occurs before the Rotation and Orientation transformations are applied. To animate a camera or light with the Orient Towards Point Of Interest option to look temporarily away from the point of interest, animate the Rotation and Orientation transform properties.

Dan Ebberts provides an expression on his MotionScript website that auto-orients a layer along only one axis. This is useful, for example, for having characters turn from side to side to follow the camera while remaining upright.

Additional resources for selecting and arranging layers

Jeff Almasol provides a script on his redefinery website that creates a panel with controls for moving various combinations of items in time: layer In point, layer Out point, layer source frames, keyframes, and markers.

Managing layers

Jeff Almasol provides a script on his redefinery website that renders and exports each of the selected layers separately. For example, use this script if layers represent different versions of an effect or different parts of an effect that you want to render as separate passes for flexibility in how they get composited.

View and change layer information

- To rename a layer or property group, do one of the following:
  - Select the item in the Timeline panel, press Enter (Windows) or Return (Mac OS), and enter the new name.
  - Right-click (Windows) or Control-click (Mac OS) the item in the Timeline panel, choose Rename, and enter the new name.
- To alternate between viewing the names of source footage items and the names of layers in the Timeline panel, click the Layer Name/Source Name column heading in the Timeline panel.

Note:

When the layer name and the source footage name are the same, square brackets appear around the layer name in the layer name view, like this: [layer name]

- To show the name of the source footage file for a selected layer in the Info panel, press Ctrl+Alt+E (Windows) or Command+Option+E (Mac OS).
- To see what footage item is the source for a layer, right-click (Windows) or Control-click (Mac OS) the layer in the Timeline panel and choose Reveal Layer Source In Project.

The source footage item is selected in the Project panel.

You can filter layers in the Timeline panel to show only layers with properties that match a search string or certain other characteristics. See Search and filter in the Timeline, Project, and Effects & Presets panelsand Showing properties and groups in the Timeline panel.

Jeff Almasol provides a script on his redefinery website that automatically writes specified information about footage items or layers to the Comment fields for the respective items in the Project panel or Timeline panel.

Christopher Green provides a script (Selected_Layers_Renamer.jsx) on his website with which you can rename multiple layers selected in the Timeline panel. You can search and replace text in the names, append characters to the beginning or end of the names, trim a specified number of characters from the beginning or end of the names, or replace the names with numbers in a series.

Layer switches and columns in the Timeline panel

Many of characteristics of a layer are determined by its layer switches, which are arranged in the Timeline panel in columns. By default, the A/V Features column appears to the left of the layer name, and the Switches and Modes (Transfer Controls) columns appear to the right, but you can arrange columns in a different order. (See Columns.)

To show or hide columns in the Timeline panel, click the Layer Switches , Transfer Controls , or In/Out/Duration/Stretch button in the lower-left corner of the Timeline panel. Press Shift+F4 to show or hide the Parent column. Press F4 to toggle the Switches and Modes columns.

The results of some layer switch settings depend on the settings of composition switches, which are in the upper right of the layer outline in the Timeline panel.

Quickly change the state of a switch for multiple layers by clicking the switch for one layer and dragging up or down that column for the adjacent layers.

Jeff Almasol provides a script on his redefinery website that creates a panel with which you can save and restore the layer switch settings for all layers in a composition.

Switches in the A/V Features column

Video

Toggles layer visuals on or off. (See Toggle visibility or influence of a layer or property group.)

Audio

Toggles layer sounds on or off.

Solo

Includes the current layer in previews and renders, ignoring layers without this switch set. (See Solo a layer.)

Lock

Locks layer contents, preventing all changes. (See Lock or unlock a layer.)

Switches in the Switches column

Shy

Hides the current layer when the Hide Shy Layers composition switch is selected. (See Show and hide layers in the Timeline panel.)

Collapse Transformations/Continuously Rasterize

Collapses transformations if the layer is a precomposition; continuously rasterizes if the layer is a shape layer, text layer, or layer with a vector graphics file (such as an Adobe Illustrator file) as the source footage. Selecting this switch for a vector layer causes After Effects to rerasterize the layer for each frame, which improves image quality, but also increases the time required for previewing and rendering. (See Render order and collapsing transformationsand Continuously rasterize a layer containing vector graphics.)

Quality

Toggles between Best and Draft options for layer quality for rendering, including rendering to the screen for previews. (See Layer image quality and subpixel positioning.)

Effect

Select to render the layer with effects. The switch does not affect the setting for individual effects on the layer. (See .)

Frame Blend

Sets frame blending to one of three states: Frame Mix , Pixel Motion , or off. If the Enable Frame Blending composition switch is not selected, the frame blending setting of the layer is irrelevant. (See Frame blending.)

Motion Blur

Toggles motion blur on or off for the layer. If the Enable Motion Blur composition switch is not selected, the motion blur setting of the layer is irrelevant. (See Motion blur.)

Adjustment Layer

Identifies the layer as an adjustment layer. (See Adjustment layers.)

3D Layer

Identifies the layer as a 3D layer. If the layer is a 3D layer with 3D sublayers—as is the case for a text layer with per-character 3D properties—the switch uses this icon: . (See 3D layers overview and resources.)

Toggle visibility or influence of a layer or property group

The Video (eyeball) switch for a layer controls whether the visual information for a layer is rendered for previews or final output. If the layer is an adjustment layer, the Video switch controls whether the effects on the layer are applied to the composite of the layers below it. If the layer is a camera or light, the Video switch controls whether the layer is on or off.

Several components of layers—such as paint strokes, path operations in shape layers, and text animators in text layers—each have their own Video switches. You can use the Video switch to toggle the visibility and influence of these items individually.

- To turn off the visibility of a layer deselect the Video switch for the layer.
- To select the Video switch for all layers, choose Layer > Switches > Show All Video.
- To deselect the Video switch for all layers except the selected layers, choose Layer > Switches > Hide Other Video.

Solo a layer

You can isolate one or more layers for animating, previewing, or final output by *soloing*. Soloing excludes all other layers of the same type from being rendered—both for previews in the Composition panel and for final output. For example, if you solo a video layer, any lights and audio layers are unaffected, so they appear when you preview or render the composition. However, the other video layers do not appear.

- To solo one or more layers, select the layers in the Timeline panel, and click the Solo icon to the left of the layer names.
- To solo one layer and unsolo all other layers, Alt-click (Windows) or Option-click (Mac OS) the Solo icon to the left of the layer name.

The Video switch is dimmed for other layers when a layer is soloed, indicating that the other layers are not visible.

Lloyd Alvarez provides a script on his After Effects Scripts website with which you can tag layers and then select, shy, and solo layers according to their tags. The tags are appended to comments in the Comments column in the Timeline panel.

Lock or unlock a layer

The Lock switch prevents layers from being edited accidentally. When a layer is locked, you cannot select it in either the Composition or Timeline panels. If you try to select or modify a locked layer, the layer flashes in the Timeline panel.

When a layer is locked, the Lock icon appears in the A/V Features column, which appears by default to the left of the layer name in the Timeline panel.

- To lock or unlock a layer, click the Lock switch for the layer in the Timeline panel.
- To unlock all layers in the active composition, choose Layer > Switches > Unlock All Layers.

Color labels for layers, compositions, and footage items

You can use labels (colored boxes in the Label column) in the Project panel and Timeline panel to organize and manage compositions, footage items, and layers. By default, different label colors indicate different kinds of footage items, but you can assign label colors to indicate whatever categories you choose.

Rename label groups to help you to organize and categorize layers and footage items. To see label names in the Label column, widen the column to greater than the default width.

- To select all layers with the same label color, select a layer with that label color and choose Edit > Label > Select Label Group.
- To change the color of a label for one layer, click the label in the Timeline panel and choose a color.
- To change the color of a label for all layers with that label color, select one of the layers belonging to the label group, choose Edit > Label > Select Label Group, and choose Edit > Label > *[color name]*.
- To change the names and default colors for labels, choose Edit > Preferences > Labels (Windows) or After Effects > Preferences > Labels (Mac OS).
- To change the default associations of label colors with source types, choose Edit > Preferences > Labels (Windows) or After Effects > Preferences > Labels (Mac OS).
- To disable the use of a layer's label color for layer handles and motion paths, choose Edit > Preferences > Appearance (Windows) or After Effects > Preferences > Appearance (Mac OS), and deselect Use Label Colors For Layer Handles And Paths.
- To disable the use of a layer, footage item, or composition's label color in the tabs of corresponding panels, choose Edit > Preferences > Appearance (Windows) or After Effects > Preferences > Appearance (Mac OS), and deselect Use Label Colors For Related Tabs.

Note:

By default, the panel label colors do not respond to the Brightness control in the Appearance preferences. To make the Brightness control affect panel label colors, select the Affects Label Colors option in the Appearance preferences.

Show and hide layers in the Timeline panel

You can mark a layer as *shy* and then use the Hide Shy Layers composition switch at the top of the Timeline panel to hide all shy layers in the Timeline panel layer outline. Making layers shy is useful for making room in the Timeline panel to show the layers and layer properties that you want to adjust.

The icon in the Switches column indicates whether a layer is shy or not shy .

Shy layers are still rendered, both for previews and for final output. To exclude layers from previews or final output, use the Video switch or make the layer a guide layer.

- To toggle a layer between shy and not shy, click the Shy switch for the layer, or select the layer in the Timeline panel and choose Layer > Switches > Shy.
- To toggle between hiding and showing all shy layers, click to select or deselect the Hide Shy Layers composition switch at the top of the Timeline panel, or choose Hide Shy Layers from the Timeline panel menu.

You can also filter layers in the Timeline panel to show only layers with properties that match a search string or certain other characteristics. See Search and filter in the Timeline, Project, and Effects & Presets panelsand Showing properties and groups in the Timeline panel.

Lloyd Alvarez provides a script on his After Effects Scripts website with which you can tag layers and then select, shy, and solo layers according to their tags. The tags are appended to comments in the Comments field in the Timeline panel.

Layer image quality and subpixel positioning

The quality setting of a layer determines how precisely it is rendered, as well as influencing the precision of other calculations involving the layer, such as motion tracking and the use of the layer as a control layer for a compound effect.

Duplicated or split layers retain the Quality setting of the original layer.

You can choose between three options for quality: Best, Draft, and Wireframe. When you select the Best option, you can choose between Bilinear and bicubic sampling, which are described in the next section.

To toggle between Best (bilinear sampling), Draft, and Best (bicubic sampling) quality of selected layers, click the Quality switch in the Timeline panel. To choose from all these options plus the Wireframe option, choose Layer > Quality:

Best Displays and renders a layer using subpixel positioning, anti-aliasing, 3D shading, and complete calculation of any applied effects. Best requires the most time for rendering—both for previews and for final output.

Draft Displays a layer so that you can see it, but only at rough quality. Draft quality displays and renders a layer without anti-aliasing and subpixel positioning, and some effects are not precisely calculated.

Wireframe Displays a layer as a box, without layer contents. Layer wireframes are displayed and rendered faster than layers rendered with Best or Draft settings.

Bilinear and bicubic sampling

For layers with quality set to Best, you can choose between bicubic and bilinear sampling. This per-layer setting determines how pixels are sampled for transformations such as scaling.

The default keyboard shortcuts for setting the sampling method for selected layers are Alt+B (Windows) and Option+B (Mac OS) for Best/Bilinear and Alt+Shift+B (Windows) and Option+Shift+B (Mac OS) for Best/Bicubic.

Bicubic sampling is somewhat more processor-intensive than bilinear sampling, and bicubic sampling is not the highest-quality choice in all cases. It's rather easy to see artifacts with bicubic sampling in some circumstances, such as ringing and overshoots at a hard transition from one color to another. Bicubic sampling tends to be the best option in cases where transitions from one color to another are more gradual, as is the case with nearly all real-world photographic images, but not necessarily for sharp-edged graphics. Bicubic sampling helps more for scaling up than it does for scaling down.

Note:

Textures in the ray-traced 3D renderer do not use bicubic sampling; they always use bilinear sampling. Transformations within effects also still use bilinear sampling, unless the effect specifically implements another method (as with a dedicated scaling plug-in effect or distortion effect).

Subpixel positioning

Property values (like Position and Anchor Point) in After Effects are not restricted to integer values; they can have fractional values, too. This allows for smooth animation, as a value is interpolated from one keyframe to another. For example, if a Position value goes from [0,0,0] at a keyframe at time 0 to a value of [0,0,80] at time 1 second in a 25-frames-per-second composition, then the value at frame 1 is [0,0,3.2].

After Effects calculates all spatial values, like Position and effect control points, to a precision of 1/65,536 of a pixel. This is called *subpixel precision*.

If the pixels of a layer aren't positioned directly on the pixel boundaries of the composition, a small amount of blur occurs—very similar to *anti-aliasing*. This blur is not a problem for an object in motion, because objects in motion have motion blur, but it can soften fine details in a static image. Also, if an image is moving slowly or at just the wrong speed, the image can appear to oscillate between sharpness and blurriness.

Because the default anchor point for a layer is the center of an object, odd-sized objects have non-integer anchor points and appear soft when positioned at integer values. To minimize blurriness and in-and-out of focus result, follow these guidelines:

- Create graphics with odd or even dimensions, based on the dimensions of the composition. For example, if the composition is 640x480 pixels, create graphics with even dimensions (such as 100x100 pixels); if the composition is 99x99 pixels, create graphics with odd dimensions (such as 75x53 pixels).
- Set the position information for graphics (including the hold position and final position keyframes) to integers and not fractional numbers.

Continuously rasterize a layer containing vector graphics

When you import vector graphics, After Effects automatically rasterizes them. However, if you want to scale a layer that contains vector graphics above 100%, then you need to continuously rasterize the layer to maintain image quality. You can continuously rasterize vector graphics in layers based on Illustrator, SWF, EPS, and PDF files. Continuously rasterizing causes After Effects to rasterize the file as needed based on the transformation for each frame. A continuously rasterized layer generally produces higher-quality results, but it may render more slowly.

Shape layers and text layers are always continuously rasterized.

When you apply an effect to a continuously rasterized layer, the results may differ from the results of applying the effect to a layer without continuous rasterization. This difference in results is because the default rendering order for the layer changes. The default rendering order for a layer without continuous rasterization is masks, followed by effects, and then transformations; whereas the default rendering order for a continuously rasterized layer is masks, followed by transformations, and then effects.

Whether or not you continuously rasterize, if you view and render a composition using Best Quality, After Effects *anti-aliases* (smooths) the vector graphics.

You cannot open or interact with a continuously rasterized layer in a Layer panel. A result of this limitation is that you can't paint directly on a continuously rasterized layer. However, you can copy and paste paint strokes from other layers.

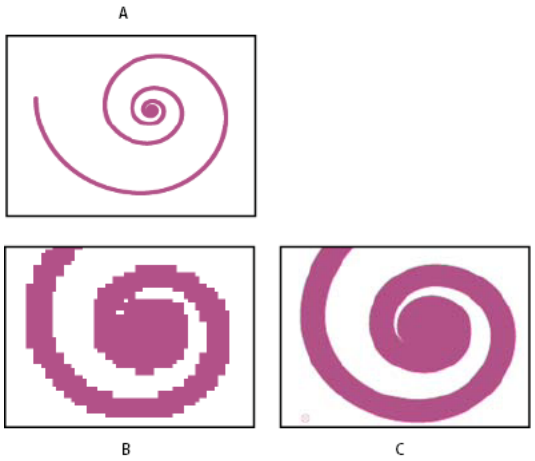


Image from imported Illustrator file
***A** Original **B** Enlarged with Continuously Rasterize switch turned off **C** Enlarged with Continuously Rasterize switch turned on*

? In the Timeline panel, click the layer's Continuously Rasterize switch , which is the same as the Collapse Transformations switch for precomposition layers.

Layer properties

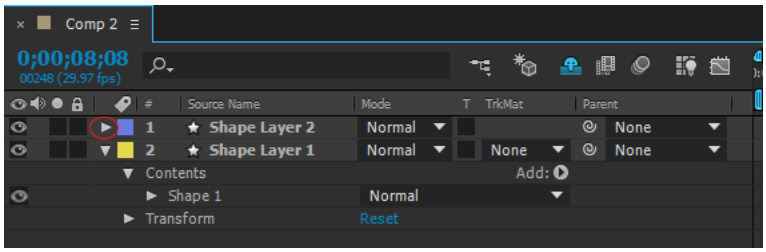
Layer properties in the Timeline panel

Each layer has *properties*, many of which you can modify and animate. The basic group of properties that every layer has is the Transform group, which includes Position and Opacity properties. When you add certain features to a layer—for example, by adding masks or effects, or by converting the layer to a 3D layer—the layer gains additional properties, collected in property groups.

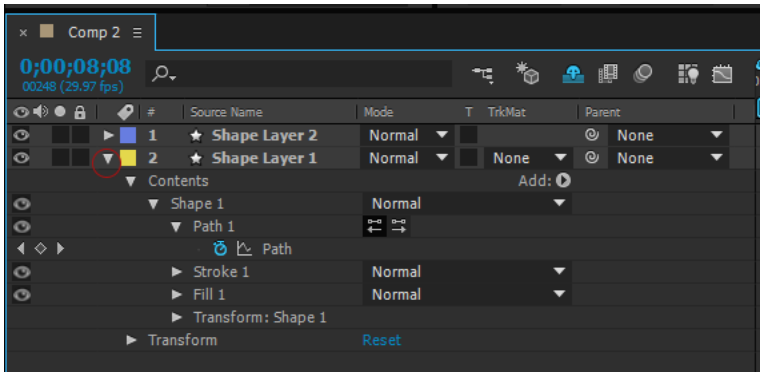
All layer properties are *temporal*—they can change the layer over time. Some layer properties, such as Opacity, have only a temporal component. Some layer properties, such as Position, are also *spatial*—they can move the layer or its pixels across composition space.

You can expand the layer outline to display layer properties and change property values.

Most properties have a stopwatch . Any property with a stopwatch can be animated—that is, changed over time. (See About animation, keyframes, and expressions.)



Collapsed property group in layer outline



Expanded property group in layer outline

Properties in the Effects property group (*effect properties*) are also layer properties. Many effect properties can also be modified in the Effect Controls panel.

Show or hide properties in the Timeline panel

- To expand or collapse a property group, click the triangle to the left of the layer name or property group name.
- To expand or collapse a property group and all of its children, Ctrl-click (Windows) or Command-click (Mac OS) the triangle.
- To expand or collapse all groups for selected layers, press Ctrl+` (accent grave) (Windows) or Command+` (accent grave) (Mac OS).
- To reveal an effect property in the Timeline panel, double-click the property name in the Effect Controls panel.
- To hide a property or property group, Alt+Shift-click (Windows) or Option+Shift-click (Mac OS) the name in the Timeline panel.
- To show only the selected properties or property groups in the Timeline panel, press SS.

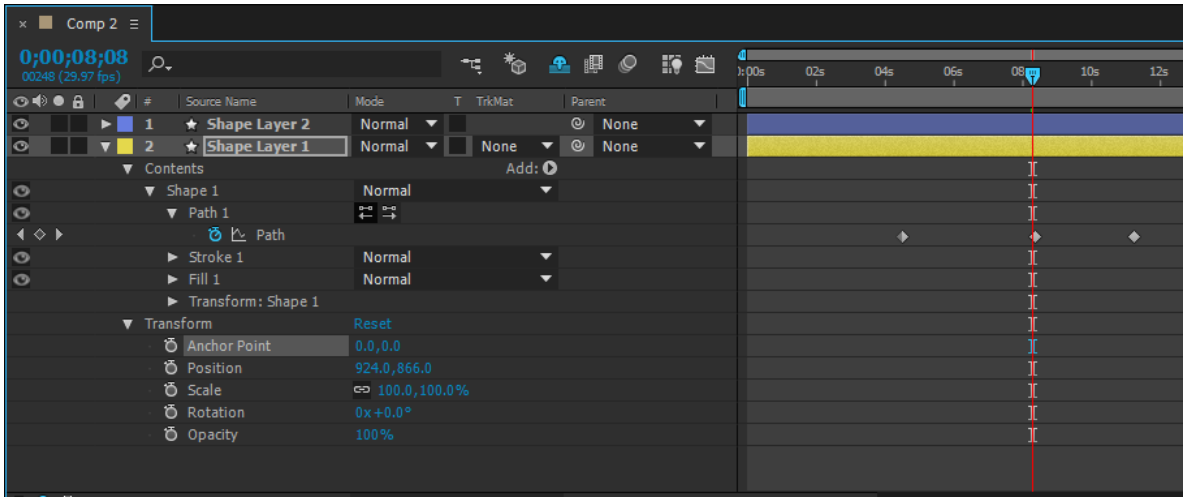
The SS shortcut is especially useful for working with paint strokes. Select the paint stroke in the Layer panel, and press SS to open the property group for that stroke in the Timeline panel.

- To show only a specific property or property group, press its shortcut key or keys. (See Showing properties and groups in the Timeline panel.)
- To add a property or property group to the properties shown in the Timeline panel, hold Shift while pressing the shortcut key for the property or property group.
- To show only properties that have been modified from their default values, press *UU*, or choose Animation > Reveal Modified Properties.
- To show only properties that have keyframes or expressions, press *U*, or choose Animation > Reveal Animating Properties.

The U and UU commands are especially useful for learning how animation presets, template projects, or other animated items work, because they isolate the properties that were modified by the designer of those items.

You can also filter layers in the Timeline panel to show only layers with properties that match a search string. See Search and filter in the Timeline, Project, and Effects & Presets panels.

Select a property or property group in the Timeline panel



- To select a property or property group—including all values, keyframes, and expressions—click the name in the layer outline in the Timeline panel.

Copy or duplicate a property or property group in the Timeline panel

- To copy properties from one layer or property group to another, select the layer, property, or property group, press Ctrl+C (Windows) or Command+C (Mac OS), select the target layer, property, or property group, and press Ctrl+V (Windows) or Command+V (Mac OS).
- To duplicate a property group, select the property group and press Ctrl+D (Windows) or Command+D (Mac OS).

  You can only duplicate some property groups, including shapes, masks, and effects. However, you can't duplicate top-level property groups such as Contents, Masks, Effects, and Transforms. If you attempt to duplicate a top-level property group, the entire layer is duplicated, instead.

Copy a value from a layer property that contains no keyframes

You can copy the current value of a layer property to another layer, even when the original layer contains no keyframes.

1. In the Timeline panel, show the layer property containing the value you want to copy.
2. Click the name of the layer property to select it.
3. Choose Edit > Copy.
4. Select the layer into which you want to paste the value.
5. If the target layer contains keyframes, move the current-time indicator to the time where you want to paste the value. If the target layer does not contain keyframes, the new value applies to the entire duration of the layer.
6. Choose Edit > Paste.

Set a property value

If multiple layers are selected and you change a property for one layer, then the property is changed for all selected layers. Sliders, angle controls, and some other property controls are only available in the Effect Controls panel.

To change the units for a property, right-click (Windows) or Control-click (Mac OS) the underlined value, choose Edit Value, and choose from the Units menu. The available units are different for different property types. You can't change the units for some properties.

- Place the pointer over the underlined value, and drag to the left or right.
- Click the underlined value, enter a new value, and then press Enter (Windows) or Return (Mac OS).

Note:

*You can enter simple arithmetic expressions for property values and other number entries. For example, you can enter 2*3 instead of 6, 4/2 instead of 2, and 2e2 instead of 200. Such entries can be especially useful when incrementing a value by a specific amount from its original value.*

- Right-click (Windows) or Control-click (Mac OS) the underlined value and choose Edit Value.
- Drag the slider left or right.
- Click a point inside the angle control or drag the angle control line.

Note:

After you click inside the angle control, you can drag outside it for more precision.

- To increase or decrease the property value by 1 unit, click the underlined value and press the Up Arrow or Down Arrow key. To increase or decrease by 10 units, hold Shift while pressing the Up Arrow or Down Arrow key. To increase or decrease by 0.1 units, hold Ctrl (Windows) or Command (Mac OS) while pressing the Up Arrow or Down Arrow key.
- To reset properties in a property group to their default values, click Reset next to the property group name. To reset an individual property, right-click (Windows) or Control-click (Mac OS) the property name (not the value) and choose Reset from the context menu.

  If the property contains keyframes, a keyframe is added at the current time with the default value.

Alan Shisko provides a video tutorial on his Motion Graphics 'n Such blog shows how to use label colors and multiple selections to rapidly change properties for multiple layers simultaneously.

Charles Bordenave (nab) provides a script on the After Effects Scripts website that sets the properties in the Transform group for selected layers to random values within constraints that you set.

The LockProperties script, available from the After Effects Scripts website, locks only specified properties so that you can prevent accidental changes.

Layer anchor points

Transformations, such as rotation and scale, occur around the anchor point (sometimes called *transformation point* or *transformation center*) of the layer. By default, the anchor point for most layer types is at the center of the layer.

Though there are times when you'll want to animate the anchor point, it's most common to set the anchor point for a layer before you begin animating. For example, if you're animating an image of a person made up of one layer for each body part, you'll probably want to move the anchor point of each hand to the wrist area so that the hand rotates around that point for the whole animation.

The easiest way to pan and scan over a large image is to animate Anchor Point and Scale properties.

Alan Shisko provides a detailed video tutorial on his website, demonstrating how to create a complex 3D environment from 3D layers, beginning with simple 2D assets. Manipulating layer anchor points is a crucial part of this tutorial.

Anchor point in center of text layer (left) compared to anchor point moved to the end of the text layer (right)

When you use the Pan Behind (Anchor Point) tool to move the anchor point in the Composition panel (left), After Effects automatically compensates for the move so that the layer maintains its position relative to the composition frame (right).

Note:

If you don't see the anchor point in the Layer panel, select Anchor Point Path from the View menu at the lower-right area of the Layer panel.

Move a layer anchor point

- Drag the anchor point using the Selection tool in the Layer panel

Note:

Layers of some types, such as text layers and shape layers, can't be opened in the Layer panel.

- To move a layer anchor point 1 pixel, choose Anchor Point Path from the View menu at the lower-right area of the Layer panel, and press an arrow key. To move 10 pixels, hold Shift as you press an arrow key. Pixel measurements are at the current magnification in the Layer panel.
- To move a layer anchor point in the Composition panel without moving the layer, select the layer and use the Pan Behind (Anchor Point) tool to drag the anchor point.

Note:

Moving an anchor point with the Pan Behind (Anchor Point) tool changes Position and Anchor Point values so that the layer remains where it was in the composition before you moved the anchor point. To change only the Anchor Point value, Alt-drag (Windows) or Option-drag (Mac OS) with the Pan Behind (Anchor Point) tool.

Charles Bordenave (nab) provides a script on the After Effects Scripts website that moves the anchor points of selected layers without moving the layers in the composition frame.

Reset a layer anchor point

- To reset the anchor point to its default location in the layer, double-click the Pan Behind (Anchor Point) tool button in the Tools panel.
- To reset the anchor point to its default location in the layer, Alt-double-click (Windows) or Option-double-click (Mac OS) the Pan Behind (Anchor Point) tool button. The layer moves to the center of the composition

Set layer anchor point to center of content

You can set the anchor point to be in the center of the layer content in any of the following ways:

- Select **Layer** > **Transform** > **Center Anchor Point In Layer Content**
- Use the keyboard shortcut Ctrl+Alt+Home (Windows) or Command+Option+Home (Mac OS)
- Ctrl+double-click (Windows) or Command+double-click (Mac OS) the **Pan Behind (Anchor Point)** tool

Here are a few uses of this command:

- setting the anchor point of a shape layer to the center of a single shape or to the centroid of a group of shapes in a shape layer
- setting the anchor point for a text layer to the center of the text content
- setting the anchor point of a layer to the center of the visible area within a masked region

Scale or flip a layer

As with other transformations, scaling of a layer occurs around the anchor point of the layer. If you move the anchor point away from the center of the layer, the layer may move when you flip it. Some layers—such as camera, light, and audio-only layers—don't have a Scale property.

You can scale a layer beyond the composition frame.

For information on scaling exponentially, as with a zoom lens, see Use Exponential Scale to change the speed of scaling.

For information on scaling or resizing entire movies rather than a single layer, see Scaling a movie upand Scaling a movie down.

To *flip* a layer is to multiply the horizontal or vertical component of its Scale property value by -1. A layer flips around its anchor point.

- To flip selected layers, choose Layer > Transform > Flip Horizontal or Layer > Transform > Flip Vertical.
- To scale a layer proportionally in the Composition panel, Shift-drag any layer handle.
- To scale a layer freely in the Composition panel, drag a corner layer handle.
- To scale one dimension only in the Composition panel, drag a side layer handle.
- To increase or decrease Scale for a selected layer by 1%, hold down Alt (Windows) or Option (Mac OS) as you press + or – on the numeric keypad.

- To increase or decrease Scale for selected layers by 10%, hold down Alt+Shift (Windows) or Option+Shift (Mac OS) as you press + or – on the numeric keypad.
- To scale an entire composition, choose File > Scripts > Scale Composition.jsx.
- To scale and center selected layers to fit in the composition frame, choose Layer > Transform > Fit To Comp.
- To scale and center selected layers to fit the width or height of the composition frame, while preserving the aspect ratio of the layer, choose Layer > Transform > Fit To Comp Width, or Layer > Transform > Fit To Comp Height.
- To scale a layer proportionally in the Timeline panel, select the layer, press S to display the Scale property, click the Constrain Proportions icon to the left of the Scale values, and enter a new value for the x, y, or z scale.

To activate the Constrain Proportions icon and match the height to the width, Alt-click (Windows) or Option-click (Mac OS) it.

- To scale to a specific set of pixel dimensions, right-click (Windows) or Control-click (Mac OS) the Scale value in the Timeline panel, choose Edit Value, and change the units to pixels in the Scale dialog box. Select Include Pixel Aspect Ratio to see and adjust dimensions in terms of the composition's pixel aspect ratio.

Scaling down a raster (non-vector) layer sometimes causes a slight softening or blurring of the image. Scaling up a raster layer by a large factor can cause the image to appear blocky or pixelated.

Detail-preserving Upscale effect

The Detail-preserving Upscale effect is capable of scaling up images by large amounts while preserving details in the image.

For more information, see .

Bilinear and bicubic sampling

You can choose between bicubic and bilinear sampling for selected layers, which determines how pixels are sampled for scaling and for all transformations applied using the Transform effect.

For more information, see Layer image quality and subpixel positioning.

Other tools and resources for scaling

Adobe Photoshop provides fine control over resampling methods used for scaling of images. For fine control of resampling, you can export frames to Photoshop to change the image size and then import the frames back into After Effects.

Though it's not very well suited for movies, the content-aware scaling feature in Photoshop is very useful for extending and scaling still images. This feature can be useful when repurposing images for wide-screen formats that were created for standard-definition formats.

For a script that scales multiple compositions simultaneously, go to the AE Enhancers forum.

Lloyd Alvarez provides a script on the After Effects Scripts website that scales selected layers to fit the composition frame, and provides options for cropping or letterboxing.

Aharon Rabinowitz provides a video tutorial on the Creative COW website that demonstrates the uses of changing and animating a 3D layer's Scale property, including changing only the z dimension of Scale.

Rotate a 2D layer

As with other transformations, rotation of a layer occurs around the anchor point of the layer.

To reveal the Rotation property value for selected layers in the Timeline panel, press R.

The first part of the Rotation property value is the number of whole rotations; the second part is the fractional rotation in degrees.

For information on rotating 3D layers, see Rotate or orient a 3D layer.

- To rotate a layer by dragging in the Composition panel, drag the layer using the Rotation tool . To constrain rotation to 45° increments, hold down Shift as you drag.
- To rotate selected layers by 1 degree, press plus (+) or minus (-) on the numeric keypad.
- To rotate selected layers by 10 degrees, press Shift+plus (+) or Shift+minus (-) on the numeric keypad.

Adjust audio volume levels

When you use footage containing audio, the default audio level for playback is 0 dB, meaning that the level is unadjusted in After Effects. Setting a positive decibel level increases volume, and setting a negative decibel level decreases volume.

Note:

Double-clicking an Audio Levels keyframe activates the Audio panel.

The VU meter in the Audio panel displays the volume range for the audio as it plays. The red blocks at the top of the meter represent the volume limit of your system.

For more precision in setting audio levels by dragging sliders, increase the height of the Audio panel.

? In the Audio panel, to adjust volume, do one of the following:

- To set the level of the left and right channels together, drag the center slider up or down.
- To set the level of the left channel, drag the left slider up or down, or type a new value in the levels box at the bottom of the left slider.
- To set the level of the right channel, drag the right slider up or down, or type a new value in the levels box at the bottom of the right slider.

Parent and child layers

To synchronize changes to layers by assigning one layer's transformations to another layer, use *parenting*. After a layer is made a parent to another layer, the other layer is called the *child layer*. When you assign a parent, the transform properties of the child layer become relative to the parent layer instead of to the composition. For example, if a parent layer moves 5 pixels to the right of its starting position, then the child layer also moves 5 pixels to the right of its position. Parenting is similar to grouping; transformations made to the group are relative to the anchor point of the parent.

Parenting affects all transform properties except Opacity: Position, Scale, Rotation, and (for 3D layers) Orientation.

Note:

When parenting layers, helpful text describing alternate parenting behaviors is displayed on the layer bar below the mouse position and in the Info panel.

A layer can have only one parent, but a layer can be a parent to any number of layers in the same composition.

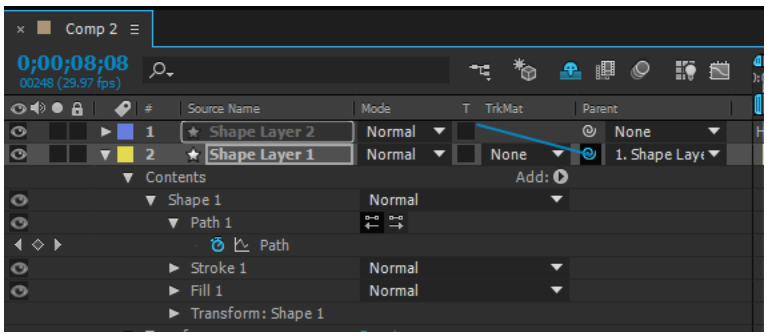
You can animate child layers independent of their parent layers. You can also parent using null objects, which are hidden layers.

You cannot animate the act of assigning and removing the parent designation—that is, you cannot designate a layer as a parent at one point in time and designate it as a normal layer at a different point in time.

When you create a parenting relationship, you can choose whether to have the child take on the transform property values of the parent or retain its own. If you choose to have the child take on the transform property values of the parent, the child layer *jumps* to the parent's position. If you choose to have the child retain its own transform property values, then the child stays where it is. In both cases, subsequent changes to the transform property values of the parent are applied to the child. Similarly, you can choose whether the child *jumps* when the parenting relationship is removed.

Note:

When parenting layers, you can use the Shift key to move the child layer to the location of the parent. This can be useful when you want to attach a layer to a null, but have the layer move to the location of the parent null (for example, attaching a 3D text layer to a null layer created from the 3D Camera Tracker).



Dragging the pick whip in the Timeline panel from Shape layer 1 (child layer) to designate Shape Layer 2 as the parent layer

Note:

To show or hide the Parent column in the Timeline panel, choose Columns > Parent from the Timeline panel menu.

- To parent a layer, in the Parent column, drag the pick whip from the layer that is to be the child layer to the layer that is to be the parent layer.
- To parent a layer, in the Parent column, click the menu of the layer that you want to be the child, and choose a parent layer name from the menu.
- To remove a parent from a layer, in the Parent column, click the menu of the layer to remove the parent from, and choose None.
- To extend the selection to include all child layers of a selected parent layer, right-click (Windows) or Control-click (Mac OS) the layer in the Composition or Timeline panel, and choose Select Children.
- To make a child layer jump when a parent is assigned or removed, hold down Alt (Windows) or Option (Mac OS) as you assign or remove the parent.
- To remove a parent from a layer (that is, set Parent to None), Ctrl-click (Windows) or Command-click (Mac OS) the parenting pick whip of the child layer in the Timeline panel. Alt+Ctrl-click (Windows) or Option+Command-click (Mac OS) the parenting pick whip of the child layer to remove the parent and cause the child layer to jump.

Online resources about parent and child layers

Paul Tuersley provides a script on the AE Enhancers forum for duplicating a parent layer and all of its children, preserving the parenting hierarchy.

Carl Larsen provides a video tutorial on the Creative COW website that demonstrates how to use expressions and parenting to relate the rotation of a set of wheels to the horizontal movement of a vehicle.

Robert Powers provides a video tutorial on the Slippery Rock NYC website that demonstrates the use of parenting and the Puppet tools to animate a character.

Null object layers

To assign a parent layer, but keep that layer from being a visible element in your project, use a null object. A null object is an invisible layer that has all the properties of a visible layer so that it can be a parent to any layer in the composition. Adjust and animate a null object as you would any other layer. You use the same commands to modify settings for a null object that you use for a solid-color layer (Layer > Solid Settings).

You can apply Expression Controls effects to null objects and then use the null object as a control layer for effects and animations in other layers. For example, when working with a camera or light layer, create a null object layer and use an expression to link the Point Of Interest property of the camera or light to the Position property of the null layer. Then, you can animate the Point Of Interest property by moving the null object. It is often easier to select and see a null object than it is to select and see the point of interest.

A composition can contain any number of null objects. A null object is visible only in the Composition and Layer panels and appears in the Composition panel as a rectangular outline with layer handles. Effects are not visible on null objects.

? To create a null object, select the Timeline or Composition panel and choose Layer > New > Null Object.

Note:

The anchor point of a new null object layer appears in the upper-left corner of the layer, and the layer is anchored in the center of the composition at its anchor point. Change the anchor point as you would for any other layer.

If a null object is visually distracting in your composition frame, consider dragging it out of the frame, onto the pasteboard.

Andrew Kramer provides a video tutorial on his Video Copilot website that demonstrates the use of a null object to animate a 3D stroke.

Guide layers

You can create *guide layers* from existing layers to use for reference in the Composition panel, to help you position and edit elements. For example, you can use guide layers for visual reference, for audio timing, for timecode reference, or for storing comments to yourself.

A guide layer icon appears next to the name of a guide layer or its source in the Timeline panel.

By default, guide layers aren't rendered when you create output but can be rendered when desired by changing the render settings for the composition.

Note:

Guide layers in nested compositions can't be viewed in the containing composition.

- To convert selected layers to guide layers, choose Layer > Guide Layer.
- To render a composition with its visible guide layers, click Render Settings in the Render Queue panel, and choose Current Settings from the Guide Layers menu in the Render Settings dialog box.
- To render a composition without rendering guide layers, click Render Settings in the Render Queue panel, and choose All Off from the Guide Layers menu in the Render Settings dialog box.

Blending modes and layer styles

Work with layer blending modes

Blending modes for layers control how each layer blends with or interacts with layers beneath it. Blending modes for layers in After Effects (formerly referred to as layer modes and sometimes called transfer modes) are identical to blending modes in Adobe Photoshop.

Most blending modes modify only color values of the source layer, not the alpha channel. The Alpha Add blending mode affects the alpha channel of the source layer, and the silhouette and stencil blending modes affect the alpha channels of layers beneath them.

You can't directly animate blending modes by using keyframes. To change a blending mode at a specific time, split the layer at that time and apply the new blending mode to the part of the layer that continues. You can also use the Compound Arithmetic effect, the results of which are similar to the results of blending modes but can change over time.

Each layer has a blending mode, even if that blending mode is the default Normal blending mode.

Note:

To blend colors with a gamma value of 1, choose File > Project Settings and select Blend Colors Using 1.0 Gamma. Deselect this option to blend colors in the working color space for the project. (See Linearize working space and enable linear blending.)

Blending modes for multiple masks on a single layer are called *mask modes*.

Some effects include their own blending mode options. For details, see the descriptions of the individual effects.

- To cycle through blending modes for selected layers, hold down the Shift key and press - (hyphen) or = (equal sign) on your main keyboard.

Note:

These shortcuts provide a convenient way to experiment with the appearance of various blending modes.

- To apply a blending mode to selected layers, choose a blending mode from the menu in the Mode column in the Timeline panel or from the Layer > Blending Mode menu.
- To show the Modes column in the Timeline panel, choose Columns > Modes from the panel menu, or click the Expand Or Collapse The Transfer Controls button at the lower-left corner of the Timeline panel.

Trish and Chris Meyer provide tips and tricks for using blending modes to achieve a filmic look in this PDF document on the Artbeats website.

Trish and Chris Meyer explain how to use blending modes, layer styles, and the Displacement Map effect to make text blend in to appear to be part of a surface in the PDF article "Writing on the Wall" on the Artbeats website.

Blending mode reference

The following descriptions use these terms:

- The source color is the color of the layer or paint stroke to which the blending mode is applied.
- The underlying color is the color of the composited layers below the source layer or paint stroke in the layer stacking order in the Timeline panel.
- The result color is the output of the blending operation; the color of the composite.

All blending modes described in this section are available for blending between layers. Some of these options are available for paint strokes, layer styles, and effects.

For in-depth information about the concepts and algorithms behind these blending modes as implemented in several Adobe applications, see section 7.2.4 of version 1.7 of the PDF reference on the Adobe website.

The blending mode menu is subdivided into eight categories based on similarities between the results of the blending modes. The category names do not appear in the interface; the categories are simply separated by dividing lines in the menu.

Normal category Options are Normal, Dissolve, and Dancing Dissolve. The result color of a pixel is not affected by the color of the underlying pixel unless Opacity is less than 100% for the source layer. The Dissolve blending modes turn some of the pixels of the source layer transparent.

Subtractive category Options include Darken, Multiply, Color Burn, Classic Color Burn, Linear Burn, and Darker Color. These blending modes tend to darken colors, some by mixing colors in much the same way as mixing colored pigments in paint.

Additive category Options are Add, Lighten, Screen, Color Dodge, Classic Color Dodge, Linear Dodge, and Lighter Color. These blending modes tend to lighten colors, some by mixing colors in much the same way as mixing projected light.

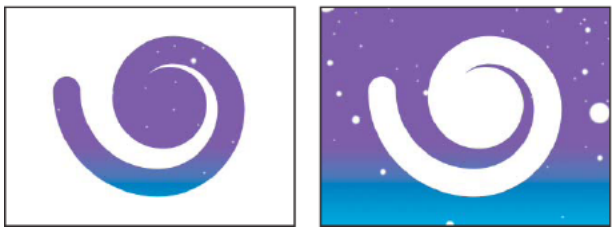
Complex category Options include Overlay, Soft Light, Hard Light, Linear Light, Vivid Light, Pin Light, and Hard Mix. These blending modes perform different operations on the source and underlying colors depending on whether one of the colors is lighter than 50% gray.

Difference category Options include Difference, Classic Difference, Exclusion, Subtract, and Divide. These blending modes create colors based on the differences between the values of the source color and the underlying color.

HSL category Options include Hue, Saturation, Color, and Luminosity. These blending modes transfer one or more of the components of the HSL representation of color (hue, saturation, and luminosity) from the underlying color to the result color.

Matte category Options include Stencil Alpha, Stencil Luma, Silhouette Alpha, and Silhouette Luma. These blending modes essentially convert the source layer into a matte for all underlying layers.

The stencil and silhouette blending modes use either the alpha channel or luma values of a layer to affect the alpha channel of all layers beneath the layer. Using these blending modes differs from using a track matte, which affects only one layer. Stencil modes cut through all layers, so that you can, for example, show multiple layers through the alpha channel of the stencil layer. Silhouette modes block out all layers below the layer with the blending mode applied, so you can cut a hole through several layers at once. To keep the silhouette and stencil blending modes from cutting through or blocking all layers underneath, precompose the layers that you want to affect and nest them in your composition.



Stencil (left) shows all layers below the stencil layer through the frame of the alpha channel of the stencil layer; silhouette (right) cuts a hole through all layers below the silhouette layer.

Utility category Options are Alpha Add and Luminescent Premul. These blending modes serve specialized utility functions.

Blending mode descriptions

Note:

Some color values in the following descriptions are given in terms of the 0.0-1.0 scale from black to white.

Normal The result color is the source color. This mode ignores the underlying color. Normal is the default mode.

Dissolve The result color for each pixel is either the source color or the underlying color. The probability that the result color is the source color depends on the opacity of the source. If opacity of the source is 100%, then the result color is the source color. If opacity of the source is 0%, then the result color is the underlying color. Dissolve and Dancing Dissolve do not work on 3D layers.

Dancing Dissolve Same as Dissolve, except that the probability function is recalculated for each frame, so the result varies over time.

Darken Each result color channel value is the lower (darker) of the source color channel value and the corresponding underlying color channel value.

Multiply For each color channel, multiplies source color channel value with underlying color channel value and divides by maximum value for 8-bpc, 16-bpc, or 32-bpc pixels, depending on the color depth of the project. The result color is never brighter than the original. If either input color is black, the result color is black. If either input color is white, the result color is the other input color. This blending mode simulates drawing with multiple marking pens on paper or placing multiple gels in front of a light. When blending with a color other than black or white, each layer or paint stroke with this blending mode results in a darker color.

Color Burn The result color is a darkening of the source color to reflect the underlying layer color by increasing the contrast. Pure white in the original layer does not change the underlying color.

Classic Color Burn The Color Burn mode from After Effects 5.0 and earlier, renamed Classic Color Burn. Use it to preserve compatibility with older projects; otherwise, use Color Burn.

Linear Burn The result color is a darkening of the source color to reflect the underlying color. Pure white produces no change.

Darker Color Each result pixel is the color of darker of the source color value and the corresponding underlying color value. Darker Color is similar to Darken, but Darker Color does not operate on individual color channels.

Add Each result color channel value is the sum of the corresponding color channel values of the source color and underlying color. The result color is never darker than either input color.

Lighten Each result color channel value is the higher (lighter) of the source color channel value and the corresponding underlying color channel value.

Screen Multiplies the complements of the channel values, and then takes the complement of the result. The result color is never darker than either input color. Using the Screen mode is similar to projecting multiple photographic slides simultaneously onto a single screen.

Color Dodge The result color is a lightening of the source color to reflect the underlying layer color by decreasing the contrast. If the source color is pure black, the result color is the underlying color.

Classic Color Dodge The Color Dodge mode from After Effects 5.0 and earlier, renamed Classic Color Dodge. Use it to preserve compatibility with older projects; otherwise, use Color Dodge.

Linear Dodge The result color is a lightening of the source color to reflect the underlying color by increasing the brightness. If the source color is pure black, the result color is the underlying color.

Lighter Color Each result pixel is the color of lighter of the source color value and the corresponding underlying color value. Lighter Color is similar to Lighten, but Lighter Color does not operate on individual color channels.

Overlay Multiplies or screens the input color channel values, depending on whether or not the underlying color is lighter than 50% gray. The result preserves highlights and shadows in the underlying layer.

Soft Light Darkens or lightens the color channel values of the underlying layer, depending on the source color. The result is similar to shining a diffused spotlight on the underlying layer. For each color channel value, if the source color is lighter than 50% gray, the result color is lighter than the underlying color, as if dodged. If the source color is darker than 50% gray, the result color is darker than the underlying color, as if burned. A layer with pure black or white becomes markedly darker or lighter, but does not become pure black or white.

Hard Light Multiplies or screens the input color channel value, depending on the original source color. The result is similar to shining a harsh spotlight on the layer. For each color channel value, if the underlying color is lighter than 50% gray, the layer lightens as if it were screened. If the underlying color is darker than 50% gray, the layer darkens as if it were multiplied. This mode is useful for creating the appearance of shadows on a layer.

Linear Light Burns or dodges the colors by decreasing or increasing the brightness, depending on the underlying color. If the underlying color is lighter than 50% gray, the layer is lightened because the brightness is increased. If the underlying color is darker than 50% gray, the layer is darkened because the brightness is decreased.

Vivid Light Burns or dodges the colors by increasing or decreasing the contrast, depending on the underlying color. If the underlying color is lighter than 50% gray, the layer is lightened because the contrast is decreased. If the underlying color is darker than 50% gray, the layer is darkened because the contrast is increased.

Pin Light Replaces the colors, depending on the underlying color. If the underlying color is lighter than 50% gray, pixels darker than the underlying color are replaced, and pixels lighter than the underlying color do not change. If the underlying color is darker than 50% gray, pixels lighter than the underlying color are replaced, and pixels darker than the underlying color do not change.

Hard Mix Enhances the contrast of the underlying layer that is visible beneath a mask on the source layer. The mask size determines the contrasted area; the inverted source layer determines the center of the contrasted area.

Difference For each color channel, subtracts the darker of the input values from the lighter. Painting with white inverts the backdrop color; painting with black produces no change.

If you have two layers with an identical visual element that you want to align, place one layer on top of the other and set the blending mode of the top layer to Difference. Then, you can move one layer or the other until the pixels of the visual element that you want to line up are all black—meaning that the differences between the pixels are zero and therefore the elements are stacked exactly on top of one another.

Classic Difference The Difference mode from After Effects 5.0 and earlier, renamed Classic Difference. Use it to preserve compatibility with older projects; otherwise, use Difference.

Exclusion Creates a result similar to but lower in contrast than the Difference mode. If the source color is white, the result color is the complement of the underlying color. If the source color is black, the result color is the underlying color.

Subtract Subtracts the source color from the underlying color. If the source color is black, the result color is the underlying color. Result color values can be less than 0 in 32-bpc projects.

Divide Divides underlying color by source color. If the source color is white, the result color is the underlying color. Result color values can be greater than 1.0 in 32-bpc projects.

Hue Result color has luminosity and saturation of the underlying color, and the hue of the source color.

Saturation Result color has luminosity and hue of the underlying color, and the saturation of the source color.

Color Result color has luminosity of the underlying color, and hue and saturation of the source color. This blending mode preserves the gray levels in the underlying color. This blending mode is useful for coloring grayscale images and for tinting color images.

Luminosity Result color has hue and saturation of the underlying color, and luminosity of the source color. This mode is the opposite of the Color mode.

Stencil Alpha Creates a stencil using the alpha channel of the layer.

Stencil Luma Creates a stencil using the luma values of the layer. The lighter pixels of the layer are more opaque than the darker pixels.

Silhouette Alpha Creates a silhouette using the alpha channel of the layer.

Silhouette Luma Creates a silhouette using the luma values of the layer. Creates transparency in painted areas of the layer, allowing you to see underlying layers or background. The luminance value of the blend color determines opacity in the result color. The lighter pixels of the source cause more transparency than the darker pixels. Painting with pure white creates 0% opacity. Painting with pure black produces no change.

Alpha Add Composites layers normally, but adds complementary alpha channels to create a seamless area of transparency. Useful for removing visible edges from two alpha channels that are inverted relative to each other or from the alpha channel edges of two touching layers that are being animated.

Note:

Sometimes, when layers are aligned edge-to-edge, seams can appear between the layers. This is especially an issue with 3D layers that are joined to one another at the edges to build a 3D object. When the edges of a layer are anti-aliased, there's some partial transparency at the edges. When two areas of 50% transparency overlap, the result is not 100% opacity but 75% opacity, because the default operation is multiplication. (50% of the light gets through one layer, and then 50% of the remainder gets through the next layer, so 25% gets through the system.) This is like partial transparency in the real world. But, in some cases, you don't want this default blending. You want the two 50% opacity areas to combine to make a seamless, opaque join. You want the alpha values to be added. In these cases, use the Alpha Add blending mode.

Luminescent Premul Prevents clipping of color values that exceed the alpha channel value after compositing by adding them to the composition. Useful for compositing rendered lens or light effects (such as lens flare) from footage with premultiplied alpha channels. May also improve results when compositing footage from matting software from other

manufacturers. When applying this mode, you may get the best results by changing interpretation of the premultiplied-alpha source footage to straight alpha.

Layer styles

Photoshop provides a variety of layer styles—such as shadows, glows, and bevels—that change the appearance of a layer. After Effects can preserve these layer styles when importing Photoshop layers. You can also apply layer styles in After Effects and animate their properties.

You can copy and paste any layer style within After Effects, including layer styles imported into After Effects in PSD files.

In addition to the layer styles that add visual elements—like a drop shadow or a color overlay—each layer's Layer Styles property group contains a Blending Options property group. You can use the Blending Options settings for powerful and flexible control over blending operations.

Though layer styles are referred to as *effects* in Photoshop, they behave more like blending modes in After Effects. Layer styles follow transformations in the standard render order, whereas effects precede transformations. Another difference is that each layer style blends directly with the underlying layers in the composition, whereas an effect is rendered on the layer to which it's applied, the result of which then interacts with the underlying layers as a whole.

When you import a Photoshop file that includes layers as a composition, you can retain editable layer styles or merge layer styles into footage. When you import only one layer that includes layer styles, you can choose to ignore the layer styles or merge layer styles into footage. At any time, you can convert merged layer styles into editable layer styles for each After Effects layer based on a Photoshop footage item.

After Effects can preserve all layer styles in imported Photoshop files, but you can only add and modify some layer styles and controls within After Effects.

Note:

For details about each layer style and its properties, see Photoshop Help.

Layer styles that you can apply and edit in After Effects

Drop Shadow Adds a shadow that falls behind the layer.

Inner Shadow Adds a shadow that falls inside the contents of the layer, giving the layer a recessed appearance.

Outer Glow Adds a glow that emanates outward from the contents of the layer.

Inner Glow Adds a glow that emanates inward from the contents of the layer.

Bevel And Emboss Adds various combinations of highlights and shadows.

Use the Bevel And Emboss layer style rather than the Bevel Alpha effect if, for example, you want to apply different blending modes to the highlights and shadows of a bevel.

Satin Applies interior shading that creates a satiny finish.

Color Overlay Fills the contents of the layer with a color.

Gradient Overlay Fills the contents of the layer with a gradient.

Stroke Outlines the contents of the layer.

Add, remove, and convert layer styles

- To convert merged layer styles into editable layer styles, select one or more layers and choose Layer > Layer Styles > Convert To Editable Styles.
- To add a layer style to selected layers, choose Layer > Layer Styles, and choose a layer style from the menu.
- To remove a layer style, select it in the Timeline panel and press Delete.
- To remove all layer styles from selected layers, choose Layer > Layer Styles > Remove All.

When a layer style is applied to a vector layer—such as a text layer, a shape layer, or a layer based on an Illustrator footage item—visual elements that apply to the edges of the contents of the layer apply to the outlines of the vector objects, such as text characters or shapes. When a layer style is applied to a layer based on a non-vector footage item, the layer style applies to the edges of the layer's bounds or masks.

You can apply a layer style to a 3D layer, but a layer with a layer style can't intersect with other 3D layers or interact with other 3D layers for casting and receiving shadows. 3D layers on either side of a layer with a layer style can't intersect one another or cast shadows on one another.

When you use the Layer > Convert To Editable Text command on a text layer from a Photoshop file, any layer styles on that layer are also converted to editable layer styles.

Layer style settings

Each layer style has its own collection of properties in the Timeline panel.

Align With Layer Uses the bounding box of the layer to calculate the gradient fill.

Altitude For the Bevel And Emboss layer style,specifies the elevation of the light source above the layer, in degrees.

Choke Shrinks the boundaries of the matte of an Inner Shadow or Inner Glow before blurring.

Distance Indicates the offset distance for a Shadow or Satin layer style.

Highlight Mode, Shadow Mode Specifies the blending mode of a bevel or emboss highlight or shadow.

Jitter Varies the application of the colors and opacity of a gradient, which reduces banding.

Layer Knocks Out Drop Shadow Controls the visibility of a drop shadow in a semitransparent layer.

Reverse Flips the orientation of a gradient.

Scale Resizes the gradient.

Spread Expands the boundaries of the matte before blurring.

Use Global Light Set this option to On to use the Global Light Angle and Global Light Altitude in the Blending Options property group instead of the Angle and Altitude settings for each individual layer style. This option is useful if you have multiple layer styles applied to the same layer and want to animate the position of the light for all of them.

Blending options for layer styles

Each layer style has its own blending mode, which determines how it interacts with underlying layers. The underlying layer in this context may or may not include the layer to which the layer style is applied. For example, a drop shadow does not blend with the layer to which it's applied, because the shadow falls behind the layer; whereas an inner shadow does blend with the layer to which it's applied.

Layer styles can be categorized as interior layer styles or exterior layer styles. Interior layer styles affect the opaque pixels of the layer to which they're applied. Interior layer styles include Inner Glow, Inner Shadow, Color Overlay, Gradient Overlay, Satin, and Bevel And Emboss. Exterior layer styles do not blend with the pixels of the layer to which they're applied, but only interact with the underlying layers. Exterior layer styles include Outer Glow and Drop Shadow.

If Blend Interior Styles As Group is set to On, interior layer styles use the blending mode of the layer.

If you modify the Opacity property of a layer, the opacity of the contents of the layer and the opacity of the layer styles are all affected. If, however, you modify the Fill Opacity property in the Blending Options property group, the opacity of the layer styles is unaffected. For example, if a text layer has the Drop Shadow layer style applied, decreasing the Fill Opacity to 0 makes the text disappear, but the drop shadow remains visible.

Use the Blend Ranges From Source option to use the advanced blending options set for the Photoshop file that determine what blending operations to perform based on the color characteristics of the input layer.

Online resources about layer styles

Dave Scotland provides a video tutorial on the CG Swot website that demonstrates how to create a metallic textured logo using layer styles in After Effects.

Blend snapshots in Composition, Layer, and Footage panels with base image

You can blend snapshots in the **Composition**, **Layer**, and **Footage** panels with the base image using **Classic Difference** blending mode. To blend snapshots, hold down the *Option(macOS)*or *Alt(Windows)*key when you click the **Show Snapshot** button.

Exclude channels from blending

You can exclude one or more of the color channels of a layer from blending operations.

The Blending Options property group is only included for a layer if the layer has had a layer style added to it. To add a Blending Options property group without a layer style, add an arbitrary layer style and then immediately delete it; the Blending Options property group and its containing Layer Styles property group remain.

1. Expand the Blending Options property group for the layer in the Layer Styles property group in the Timeline panel.
2. To exclude a channel from blending, set Red, Green, or Blue to Off in the Advanced Blending property group.

   You can animate these properties, so you can exclude a channel from blending at some times but include the channel at other times.

3D layers

Note:

The content in this article applies in general to the Classic 3D renderer. For information on the Ray-traced 3D renderer, see *Extruding text and shape layers and watch this video tutorial.*

3D layers overview and resources

When you make a layer a 3D layer, the layer itself remains flat, but it gains additional properties: Position (z), Anchor Point (z), Scale (z), Orientation, X Rotation, Y Rotation, Z Rotation, and Material Options properties. Material Options properties specify how the layer interacts with light and shadows. Only 3D layers interact with shadows, lights, and cameras.

2D layers (left) and layers with 3D properties (right)

Individual characters within text layers can optionally be 3D sublayers, each with their own 3D properties. A text layer with Enable Per-character 3D selected behaves just like a precomposition that consists of a 3D layer for each character. All camera and light layers have 3D properties.

By default, layers are at a depth (z-axis position) of 0. In After Effects, the origin of the coordinate system is at the upper-left corner; x (width) increases from left to right, y (height) increases from top to bottom, and z (depth) increases from near to far. Some video and 3D applications use a coordinate system that is rotated 180 degrees around the x axis; in these systems, y increases from bottom to top, and z increases from far to near.

You can transform a 3D layer relative to the coordinate space of the composition, the coordinate space of the layer, or a custom space by selecting an axis mode.

You can add effects and masks to 3D layers, composite 3D layers with 2D layers, and create and animate camera and light layers to view or illuminate 3D layers from any angle. When rendering for final output, 3D layers are rendered from the perspective of the active camera. (See Create a camera layer and change camera settings.)

All effects are 2D, including effects that simulate 3D distortions. For example, viewing a layer with the Bulge effect from the side does not show a protrusion.

As with all masks, mask coordinates on a 3D layer are in the 2D coordinate space of the layer.

Convert 3D layers

When you convert a layer to 3D, a depth (z) value is added to its Position, Anchor Point, and Scale properties, and the layer gains Orientation, Y Rotation, X Rotation, and Material Options properties. The single Rotation property is renamed Z Rotation.

When you convert a 3D layer back to 2D, the Y Rotation, X Rotation, Orientation, and Material Options properties are removed, including all values, keyframes, and expressions. (These values cannot be restored by converting the layer back to a 3D layer.) The Anchor Point, Position, and Scale properties remain, along with their keyframes and expressions, but their z values are hidden and ignored.

Convert a layer to a 3D layer

? Select the 3D Layer switch for the layer in the Timeline panel, or select the layer and choose Layer > 3D Layer.

Convert a text layer to a 3D layer with per-character 3D properties enabled

? Choose Animation > Animate Text > Enable Per-Character 3D, or choose Enable Per-Character 3D from the Animate menu for the layer in the Timeline panel.

Convert a 3D layer to a 2D layer

? Deselect the 3D Layer switch for the layer in the Timeline panel, or select the layer and choose Layer > 3D Layer.

Show or hide 3D axes and layer controls

3D axes are color-coded arrows: red for x, green for y, and blue for z.

- To show or hide 3D axes, camera and light wireframe icons, layer handles, and the point of interest, choose View > Show Layer Controls.

If the axis that you want to manipulate is difficult to see, try a different setting in the Select View Layout menu at the bottom of the Composition panel.

- To show or hide a set of persistent 3D reference axes, click the Grid And Guides Options button at the bottom of the Composition panel, and choose 3D Reference Axes.

Chris and Trish Meyer provide a video tutorial on the ProVideo Coalition website that demonstrates the use of the 3D axis layer controls.

Move a 3D layer

1. Select the 3D layer that you want to move.
2. Do one of the following:
   - In the Composition panel, use the Selection tool to drag the arrowhead of the 3D axis layer control corresponding to the axis along which you want to move the layer. Shift-drag to move the layer more quickly.
   - In the Timeline panel, modify the Position property values.

   Press P to show Position.

   - To move selected layers so that their anchor points are at the center in the current view, choose Layer > Transform > Center In View or press Ctrl+Home (Windows) or Command+Home (Mac OS).

Rotate or orient a 3D layer

You can turn a 3D layer by changing its Orientation or Rotation values. In both cases, the layer turns around its anchor point. The Orientation and Rotation properties differ in how the layer moves when you animate them.

When you animate the Orientation property of a 3D layer, the layer turns as directly as possible to reach the specified orientation. When you animate any of the X, Y, or Z Rotation properties, the layer rotates along each individual axis according to the individual property values. In other words, Orientation values specify an angular destination, whereas Rotation values specify an angular route. Animate Rotation properties to make a layer turn multiple times.

Animating the Orientation property is often better for natural, smooth motion, whereas animating the Rotation properties provides more precise control.

Rotate or orient a 3D layer in the Composition panel

1. Select the 3D layer that you want to turn.
2. Select the Rotation tool , and choose Orientation or Rotation from the Set menu to determine whether the tool affects Orientation or Rotation properties.

3 In the Composition panel, do one of the following:

- Drag the arrowhead of the 3D axis layer control corresponding to the axis around which you want to turn the layer.
- Drag a layer handle. Dragging a corner handle turns the layer around the z axis; dragging a left or right center handle turns the layer around the y axis; dragging a top or bottom handle turns the layer around the x axis.
- Drag the layer.

Shift-drag to constrain your manipulations to 45-degree increments.

Rotate or orient a 3D layer in the Timeline panel

1 Select the 3D layer that you want to turn.

2 In the Timeline panel, modify the Rotation or Orientation property values.

Press R to show Rotation and Orientation properties.

Online resources about rotating and orienting 3D layers

Donat Van Bellinghen provides some expressions on the AE Enhancers forum for placing and orienting a 3D layer in the plane defined by three points.

Axis modes

Axis modes specify on which set of axes a 3D layer is transformed. Choose a mode in the Tools panel.

Local Axis mode Aligns the axes to the surface of a 3D layer.

World Axis mode Aligns the axes to the absolute coordinates of the composition. Regardless of the rotations you perform on a layer, the axes always represent 3D space relative to the 3D world.

View Axis mode Aligns the axes to the view you have selected. For example, suppose that a layer has been rotated and the view changed to a custom view; any subsequent transformation made to that layer while in View Axis mode happens along the axes corresponding to the direction from which you are looking at the layer.

Differences between the axis modes are only relevant when you have a 3D camera in a composition.

The Tools panel remembers the last-used 3D axis mode when you quit and restart After Effects.

Note:

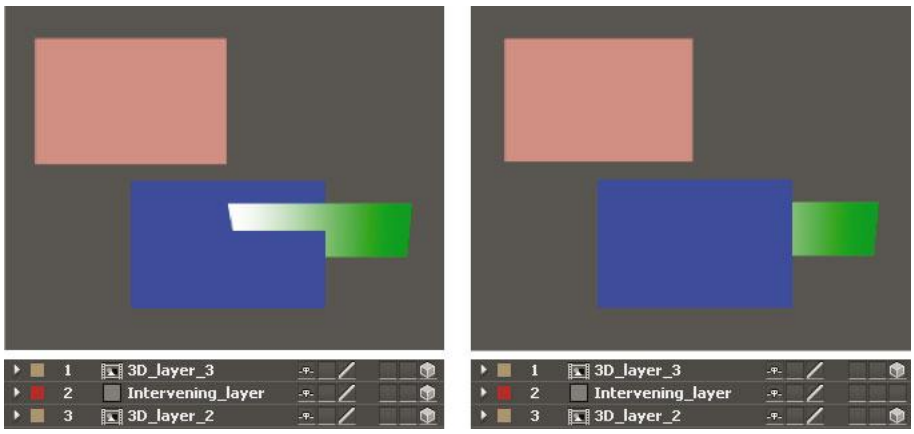
The Camera tools always adjust along the local axes of the view, so the action of the Camera tools is not affected by the axis modes.

Angie Taylor explains 3D axis modes in this tutorial.

3D layer interactions, render order, and collapsed transformations

The positions of certain kinds of layers in the layer stacking order in the Timeline panel prevent groups of 3D layers from being processed together to determine intersections and shadows.

A shadow cast by a 3D layer does not affect a 2D layer or any layer that is on the other side of the 2D layer in the layer stacking order. Similarly, a 3D layer does not intersect with a 2D layer or any layer that is on the other side of the 2D layer in the layer stacking order. No such restriction exists for lights.



3D layers intersecting (left), and 3D layers prevented from intersecting by intervening 2D layer (right)

Just like 2D layers, other types of layers also prevent 3D layers on either side from intersecting or casting shadows on one another:

- An adjustment layer
- A 3D layer with a layer style applied
- A 3D precomposition layer to which an effect, closed mask (with mask mode other than None), or track matte has been applied
- A 3D precomposition layer without collapsed transformations

A precomposition with collapsed transformations (Collapse Transformations switch selected) does not interfere with the interaction of 3D layers on either side—as long as all of the layers in the precomposition are themselves 3D layers. Collapsing transformations exposes the 3D properties of the layers that compose the precomposition. Essentially, collapsing transformations in this case allows each 3D layer to be composited into the main composition individually, rather than creating a single 2D composite for the precomposition layer and compositing that into the main composition. The tradeoff is that this setting removes your ability to specify certain layer settings for the precomposition as a whole—such as blending mode, quality, and motion blur.

Shadows cast by continuously rasterized 3D layers (including text layers) are not affected by effects applied to that layer. If you want the shadow to show the results of the effect, then precompose the layer with the effect.

To ensure that the shadow remains where expected on a 3D layer with a track matte, precompose the 3D layer and the track matte layer together (but don't collapse transformations), and then apply the shadow to the precomposition.

Effects on continuously rasterized vector layers with 3D properties are rendered in 2D and then projected onto the 3D layer. This projection does not occur for compositions with collapsed transformations.

Cameras, lights, and points of interest

Create a camera layer and change camera settings

You can view 3D layers from any angle and distance using camera layers. Just as it's easier in the real world to move cameras through and around a scene than it is to move and rotate the scene itself, it's often easiest to get different views of a composition by setting up a camera layer and moving it around in a composition.

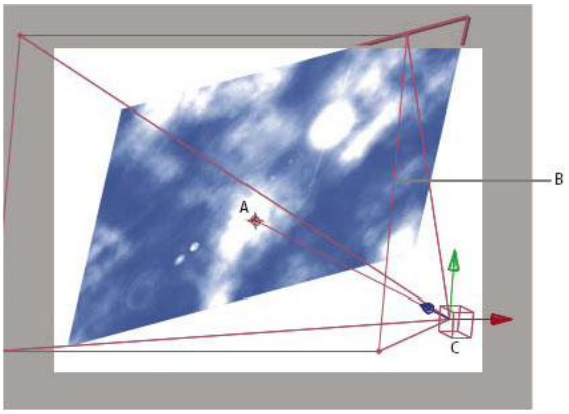
You can modify and animate camera settings to configure the camera to match the real camera and settings that were used to record footage with which you're compositing. You can also use camera settings to add camera-like behaviors—from depth-of-field blur to pans and dolly shots—to synthetic effects and animations.

Cameras affect only 3D layers and 2D layers with an effect with a Comp Camera attribute. With effects that have a Comp Camera attribute, you can use the active composition camera or lights to view or light an effect from various angles to simulate more sophisticated 3D effects.

You can choose to view a composition through the active camera or through a named custom camera. The active camera is the topmost camera in the Timeline panel at the current time for which the Video switch is selected. The active camera view is the point of view used for creating final output and nesting compositions. If you have not created a custom camera, then the active camera is the same as the default composition view.

All cameras are listed in the 3D View menu at the bottom of the Composition panel, where you can access them at any time.

It's often easiest to adjust a camera when using one of the custom 3D views. You can't—of course—see the camera to manipulate it when you're looking through the camera itself.



Example of a camera
***A** Point of interest **B** Frame **C** Camera*

Create a camera layer

? Choose Layer > New > Camera, or press Ctrl+Alt+Shift+C (Windows) or Command+Option+Shift+C (Mac OS).

Note:

By default, new layers begin at the beginning of the composition duration. You can instead choose to have new layers begin at the current time by deselecting the Create Layers At Composition Start Time preference (Edit > Preferences > General (Windows) or After Effects > Preferences > General (Mac OS)).

Change camera settings

You can change camera settings at any time.

? Double-click the camera layer in the Timeline panel, or select the layer and then choose Layer > Camera Settings.

Note:

By default, the Preview option in the Camera Settings dialog box is selected. This option shows the changes in the composition as you make them in the Camera Settings dialog box.

Camera settings

You can change camera settings at any time by double-clicking the layer in the Timeline panel or selecting the layer and choosing Layer > Camera Settings.

Select Preview in the Camera Settings dialog box to show results in the Composition panel as you modify settings in the dialog box.

Note:

The three things that affect depth of field are focal length, aperture, and focus distance. Shallow (small) depth of field is a result of long focal length, short focus distance, and a larger aperture (smaller F-stop). A shallower depth of field means a larger depth of field blur result. The opposite of a shallow depth of field is deep focus—meaning a smaller depth of field blur because more is in focus.

Camera properties relating to camera lens blur and shape include Iris Shape, Iris Rotation, Iris Roundness, Iris Aspect Ratio, Iris Diffraction Fringe, Highlight Gain, Highlight Threshold, and Highlight Saturation.

Type One-Node Camera or Two-Node Camera. A one-node camera orients around itself, whereas a two-node camera has a point of interest and orients around that point. Making a camera a two-node camera is the same as setting a camera's auto-orientation option (Layer > Transform > Auto-Orient) to Orient Towards Point Of Interest. (See Auto-Orientation options.)

Name The name of the camera. By default, Camera 1 is the name of first camera that you create in a composition, and all subsequent cameras are numbered in ascending order. Choose distinctive names for multiple cameras to make it easier to distinguish them.

Preset The type of camera settings you want to use. The presets are named according to focal lengths. Each preset is meant to represent the behavior of a 35mm camera with a lens of a certain focal length. Therefore, the preset also sets the Angle Of View, Zoom, Focus Distance, Focal Length, and Aperture values. The default preset is 50mm. You can also create a custom camera by specifying new values for any of the settings.

Zoom The distance from the lens to the image plane. In other words, a layer that is the Zoom distance away appears at its full size, a layer that is twice the Zoom distance away appears half as tall and wide, and so on.

Angle Of View The width of the scene captured in the image. The Focal Length, Film Size, and Zoom values determine the angle of view. A wider angle of view creates the same result as a wide-angle lens.

Depth Of Field Applies custom variables to the Focus Distance, Aperture, F-Stop, and Blur Level settings. Using these variables, you can manipulate the depth of field to create more realistic camera-focusing effects. (The depth of field is the distance range within which the image is in focus. Images outside the distance range are blurred.)

Focus Distance The distance from the camera to the plane that is in perfect focus.

To lock the focal plane to the camera's point of interest so that the point of interest is in focus, add this expression to the Focus Distance property: length(position, pointOfInterest)

Lock To Zoom Makes the Focus Distance value match the Zoom value.

Note:

If you change the settings of the Zoom or Focus Distance options in the Timeline panel, the Focus Distance value becomes unlocked from the Zoom value. If you need to change the values and want the values to remain locked, then use the Camera Settings dialog box instead of the Timeline panel. Alternatively, you can add an expression to the Focus Distance property in the Timeline panel: Select the Focus Distance property, and choose Animation > Add Expression; then drag the expression pick whip to the Zoom property. (See Expression basics.)

Aperture The size of the lens opening. The Aperture setting also affects the depth of field—increasing the aperture increases the depth of field blur. When you modify Aperture, the values for F-Stop change to match it.

Note:

In a real camera, increasing the aperture also allows in more light, which affects exposure. Like most 3D compositing and animation applications, After Effects ignores this result of the change in aperture values

F-Stop Represents the ratio of the focal length to aperture. Most cameras specify aperture size using the f-stop measurement; thus, many photographers prefer to set the aperture size in f-stop units. When you modify F-Stop, Aperture changes to match it.

Blur Level The amount of depth-of-field blur in an image. A setting of 100% creates a natural blur as dictated by the camera settings. Lower values reduce the blur.

Film Size The size of the exposed area of film, which is directly related to the composition size. When you modify Film Size, the Zoom value changes to match the perspective of a real camera.

Focal Length The distance from the film plane to the camera lens. In After Effects, the position of the camera represents the center of the lens. When you modify Focal Length, the Zoom value changes to match the perspective of a real camera. In addition, the Preset, Angle Of View, and Aperture values change accordingly.

Units The units of measurement in which the camera setting values are expressed.

Measure Film Size The dimensions used to depict the film size.

Note:

For best results, work in 32-bpc with Linearize Working Space selected in the project settings.

Camera Commands

After Effects has camera commands that can be used separately or with the Create Stereo 3D Rig function. To use the camera commands, select a camera layer, and then choose Layer > Camera.

Link Focus Distance to Point of Interest Creates an expression on the selected camera layer's Focus Distance property, setting the property's value to the distance between the camera and its point of interest.

Link Focus Distance to Layer Creates an expression on the selected camera layer's Focus Distance property to be the distance between the camera's position and another layer. This method allows the focus to follow the other layer automatically.

Set Focus Distance to Layer Sets the value of the Focus Distance property at the current time to the distance at the current time between the camera and the selected layer.

Online resources about cameras

For a video tutorial that shows how to create and modify a camera and use the Camera tools, see the Adobe website.

Dale Bradshaw provides a script and sample project for automating the rigging of a camera on the Creative Workflow Hacks website.

Mark Christiansen provides tips and detailed techniques for working with cameras in the "Virtual Cinematography in After Effects" chapter of After Effects Studio Techniques on the Peachpit Press website. This chapter includes information about matching lens distortion, performing camera moves, performing camera projection (camera mapping), using rack focus, creating boke blur, using grain, and choosing a frame rate to match your story-telling.

Trish and Chris Meyer provide a tutorial for using 3D layers, lights, and cameras in a PDF excerpt from their book After Effects Apprentice on the Focal Press website.

Andrew Kramer provides a two-part video tutorial on his Video Copilot website that demonstrates basic camera mapping and camera projection. The tutorial shows how to project an image onto 3D layers using lights and light transmission properties.

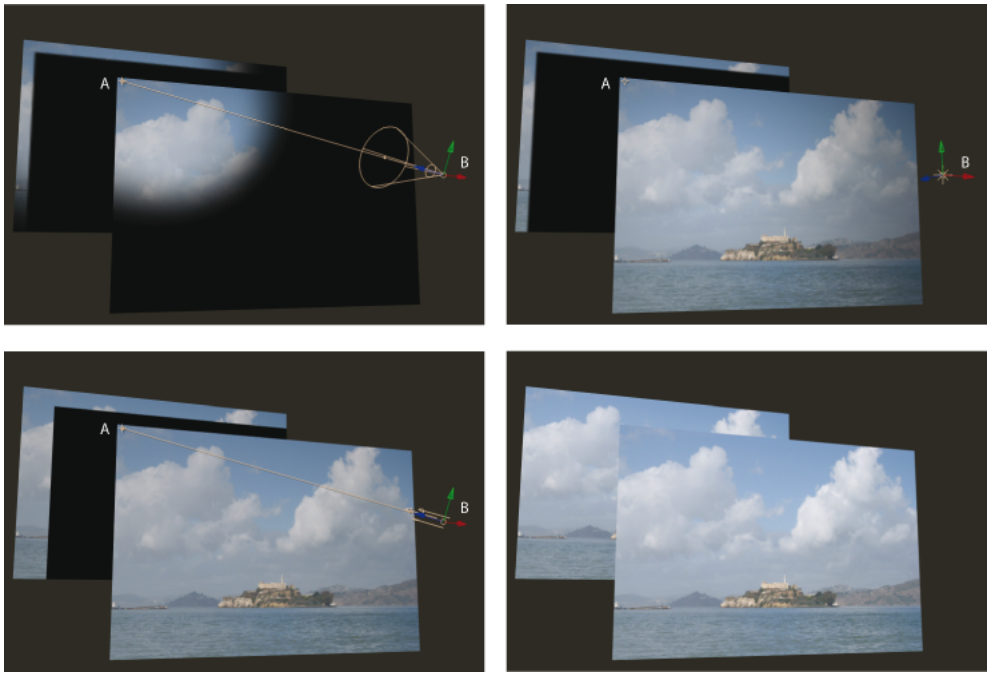
- part 1
- part 2

Create a light and change light settings

A light layer can affect the colors of the 3D layers that it shines on, depending on the light's settings and the Material Options properties of the 3D layers. Each light, by default, points to its point of interest.

Lights can be used to illuminate 3D layers and to cast shadows. You can use lights to match lighting conditions of the scene into which you are compositing or to create more interesting visual results. For example, you can use light layers to create the appearance of light streaming through a video layer as if it were made of stained glass.

You can animate all the settings for a light, except for the light type and the Casts Shadows property.



Light types: Spot (upper-left); Point (upper-right); Parallel (lower-left); Ambient (lower-right)
***A** Point of interest **B** Light icon*

You can specify which 3D layers a light affects by designating the light as an adjustment layer: place the light in the Timeline panel above the layers on which you want it to shine. Layers that are above a light adjustment layer in the layer stacking order in the Timeline panel do not receive the light, regardless of the positions of the layers in the Composition panel.

Create a light

? Choose Layer > New > Light, or press Ctrl+Alt+Shift+L (Windows) or Command+Option+Shift+L (Mac OS).

The light you create includes name of the type of light. For example, if you add a spot light, it is named 'Spot Light 1.'

If you change the light type, the name of the light type automatically changes. The light name changes if if the name is not modified and only when the light type is not changed in the Timeline panel. For example, if you change 'Spot Light 1" to a point light, After Effects automatically renames the light to 'Point Light 1.'

Note:

By default, new layers begin at the beginning of the composition duration. You can instead choose to have new layers begin at the current time by deselecting the Create Layers At Composition Start Time preference (Edit > Preferences > General (Windows) or After Effects > Preferences > General (Mac OS)).

Change light settings

? Double-click a light layer in the Timeline panel or select the layer and choose Layer > Light Settings.

Select Preview in the Light Settings dialog box to show results in the Composition panel as you modify settings in the dialog box.

Light settings

Light Type Parallel emits directional, unconstrained light from an infinitely distant source, approximating the light from a source like the Sun. Spot emits light from a source constrained by a cone, like a flashlight or a spotlight used in stage productions. Point emits unconstrained omnidirectional light, like the rays from a bare light bulb. Ambient creates light that has no source but rather contributes to the overall brightness of a scene and casts no shadows.

Note:

Because the position in space of an Ambient light does not affect its influence on other layers, an Ambient light does not have an icon in the Composition panel.

Intensity The brightness of the light. Negative values create nonlight. Nonlight subtracts color from a layer. For example, if a layer is already lit, creating a directional light with negative values also pointing at that layer darkens an area on the layer.

Color The color of the light.

Cone Angle The angle of the cone surrounding the source of a light, which determines the width of the beam at a distance. This control is active only if Spot is selected for Light Type. The cone angle of a Spot light is indicated by the shape of the light icon in the Composition panel.

Note:

In After Effects CS6 or later, a selected spot light's cone can be extended to the point of interest.

Cone Feather The edge softness of a spotlight. This control is active only if Spot is selected for Light Type.

Falloff The type of falloff for a parallel, spot, or point light. Falloff describes how a light's intensity is lessened over distance.

For details, tutorials, and resources about light falloff, see this article on the Adobe website.

Falloff types include the following:

None Illumination does not decrease as the distance between the layer and the light increases.

Smooth Indicates a smooth linear falloff starting at the Falloff Start radius and extending the length specified by Falloff Distance.

Inverse Square Clamped Indicates a physically accurate falloff starting at the Falloff Start radius and decreasing proportionally to the inverse square of the distance away.

Radius Specifies the radius of falloff from a light. Inside this distance, the light is a constant light. Outside this distance, the light falls off.

Falloff Distance Specifies the distance a light falls off from a light.

Casts Shadows Specifies whether the light source causes a layer to cast a shadow. The Accepts Shadows material option must be On for a layer to receive a shadow; this setting is the default. The Casts Shadows material option must be On for a layer to cast shadows; this setting is not the default.

Press Alt+Shift+C (Windows) or Option+Shift+C (Mac OS) to toggle Casts Shadows for selected layers. To see Material Options properties in the Timeline panel, press AA

Shadow Darkness Sets the darkness of the shadow. This control is active only if Cast Shadows is selected.

Shadow Diffusion Sets the softness of a shadow based on its apparent distance from the shadowing layer. Larger values create softer shadows. This control is active only if Casts Shadows is selected.

Online resources about lights

Eran Stern provides a video tutorial on the Creative COW website that demonstrates the use of lights as adjustment layers, to precisely control which layers are affected by which lights.

Chris and Trish Meyer provide tips about shadows and lights in 3D in an article on the ProVideo Coalition website.

Trish and Chris Meyer provide a tutorial for using 3D layers, lights, and cameras in a PDF excerpt from their book After Effects Apprentice on the Focal Press website.

Chris and Trish Meyer provide a tutorial on the Artbeats website that demonstrates how to use lights and 3D layers to project a video onto other layers, such as onto a wall.

Adjust a 3D view or move a camera, light, or point of interest

Camera layers and light layers each include a Point Of Interest property, which specifies the point in the composition at which the camera or light points. By default, the point of interest is at the center of the composition. You can move the point of interest at any time.

A one-node camera ignores the point of interest. (See Camera settings.)

To make a light ignore its point of interest, select an option other than Orient Towards Point Of Interest in the light's Auto-Orientation options. (See Auto-Orientation options.)

Note:

As with all properties, you can also modify a camera or light's properties directly in the Timeline panel.

Move a camera, light, or point of interest with the Selection and Rotation tools

1. Select a camera or light layer.
2. Using the Selection or Rotation tool, do one of the following:
   - To move the camera or light and its point of interest, position the pointer over the axis you want to adjust, and drag.
   - To move the camera or light along a single axis without moving the point of interest, Ctrl-drag (Windows), or Command-drag (Mac OS) the axis.
   - To move the camera or light freely without moving the point of interest, drag the camera icon or light icon.
   - To move the point of interest, drag the point of interest icon .

Move or adjust a camera or working 3D view with the Camera tools

You can adjust the Position and Point Of Interest properties of a camera layer by using the Camera tools in the Composition panel.

You can also use the Camera tools to adjust a *working 3D view*, a 3D view that is not associated with a camera layer. You can think of 3D views as being virtual cameras through which you can view and preview a composition. The working 3D views include the custom views and the fixed orthographic views (Front, Left, Top, Back, Right, or Bottom). The working 3D views are useful for placing and previewing elements in a 3D scene. If you use a Camera tool to adjust a working 3D view, no layer property values are affected.

After you've modified a 3D view, you can reset it by choosing View > Reset 3D View.

You can't use the Orbit Camera tool on the fixed orthographic views.

For information on choosing and using 3D views, see Choose a 3D view.

1 In the 3D View menu at the bottom of the Composition panel, choose the camera or 3D view to adjust.

2 Activate a Camera tool.

You can activate a Camera tool by selecting it in the Tools panel or pressing C to cycle through the Camera tools. The easiest way to switch between the various Camera tools is to select the Unified Camera tool and use the buttons on a three-button mouse.

Orbit Camera Rotates the 3D view or camera by moving around the point of interest. (To temporarily activate the Orbit Camera tool when the Unified Camera Tool is selected, hold the left mouse button.)

Shift-dragging with the Unified Camera tool selected temporarily activates the Orbit Camera tool and constrains rotation to one axis.

Track XY Camera Adjusts the 3D view or camera horizontally or vertically. (To temporarily activate the Track XY Camera tool when the Unified Camera Tool is selected, hold the middle mouse button.)

Track Z Camera Adjusts the 3D view or camera along the line to the point of interest. If you are using an orthographic view, this tool adjusts the scale of the view. (To temporarily activate the Track Z Camera tool when the Unified Camera Tool is selected, hold the right mouse button.)

3 Drag in the Composition panel. You can continue a drag operation outside the panel after you've begun dragging within the panel.

After you've modified a 3D view, you can reset it by choosing View > Reset 3D View.

Move or adjust a camera or working 3D view to look at layers

You can also move a camera or adjust a 3D view to look at selected layers or all layers. After Effects changes the point of view and direction of view to include the layers that you have selected.

- To adjust a 3D view or move a camera to look at selected layers, choose View > Look At Selected Layers.
- To adjust a 3D view or move a camera to look at all layers, choose View > Look At All Layers.

For keyboard shortcuts for these commands, see 3D layers.

Tips and online resources for moving and animating cameras and lights

Before moving a camera, choose a view other than Active Camera. If you use Active Camera view, you are looking through the camera, which makes it harder to manage.

By default, a camera's wireframe is only visible when the camera is selected. To always show the camera wireframe, set the view options for the Composition panel (View > View Options). (See Show or hide layer controls in the Composition panel.)

When working with a camera or light layer, create a null object layer and use an expression to link the Point Of Interest property of the camera or light to the Position property of the null layer. Then, you can animate the Point Of Interest property by moving the null object. It is often easier to select and see a null object than it is to select and see the point of interest.

In After Effects, there is a camera command, "Create Orbit Null." This parents the selected camera layer to a new null layer. The new null layer is renamed, based on the camera's name appended with Orbit Null

Trish and Chris Meyer show you how to use the Create Orbit Null camera command in this video tutorial on Adobe TV.

For a video tutorial that shows how to create and modify a camera and use the Camera tools, see the Adobe website.

Trish and Chris Meyer provide a tutorial for using 3D layers, lights, and cameras in a PDF excerpt from their book After Effects Apprentice on the Focal Press website.

Mark Christiansen provides tips and detailed techniques for working with cameras in the "Virtual Cinematography in After Effects" chapter of After Effects Studio Techniques on the Peachpit Press website. The chapter includes information about matching lens distortion, performing camera moves, performing camera projection (camera mapping), using rack focus, creating boke blur, using grain, and choosing a frame rate to match your story-telling.

Rich Young provides a set of expressions on his AE Portal website that use the *toWorld* method link a camera and light to a layer with the CC Sphere effect.

Andrew Devis of Creative COW has created a 3 tutorial series on Animating a Camera:

- Animating a Camera 1: Camera Difficulties
- Animating a Camera 2: Simple Rig
- Animating a Camera 3: Controllers & Point of View

Material Options properties

3D layers have Material Options properties, which determine how a 3D layer interacts with light and shadow.

Casts Shadows Specifies whether a layer casts shadows on other layers. The direction and angle of the shadows are determined by the direction and angle of the light sources. Set Casts Shadows to Only if you want the layer to be invisible but still cast a shadow.

Use the Only setting and a nonzero Light Transmission setting to project the colors of an invisible layer onto another layer. Steve Holmes provides a video tutorial on the Artbeats website in which he demonstrates how to use layers with Cast Shadows set to Only to cast shadows of specific shapes within a 3D scene.

Light Transmission The percentage of light that shines through the layer, casting the colors of the layer on other layers as a shadow. 0% specifies that no light passes through the layer, casting a black shadow. 100% specifies that the full values of the colors of the shadow-casting layer are projected onto the layer accepting the shadow.

Use partial light transmission to create the appearance of light passing through a stained glass window.

Accepts Shadows Specifies whether the layer shows shadows cast on it by other layers. There is an "Only" option in the Accepts Shadows for when you want to render only a shadow on a layer.

Accepts Lights Specifies whether the light reaching it affects the color of a layer. This setting does not affect shadows.

Ambient Ambient (nondirectional) reflectivity of the layer. 100% specifies the most reflectivity; 0% specifies no ambient reflectivity.

Diffuse Diffuse (omnidirectional) reflectivity of the layer. Applying diffuse reflectivity to a layer is like draping a dull, plastic sheet over it. Light that falls on this layer reflects equally in all directions. 100% specifies the most reflectivity; 0% specifies no diffuse reflectivity.

Specular Specular (directional) reflectivity of the layer. Specular light reflects from the layer as if from a mirror. 100% specifies the most reflectivity; 0% specifies no specular reflectivity.

Shininess Determines the size of the specular highlight. This value is active only if the Specular setting is greater than zero. 100% specifies a reflection with a small specular highlight. 0% specifies a reflection with a large specular highlight.

Metal The contribution of the layer color to the color of the specular highlight. 100% specifies that the highlight color is the color of the layer. For example, with a Metal value of 100%, an image of a gold ring reflects golden light. 0% specifies that the color of the specular highlight is the color of the light source. For example, a layer with a Metal value of 0% under a white light has a white highlight.

Specify resolution to use for rendering shadows

The Advanced 3D rendering plug-in is used to render compositions containing intersecting 3D layers. To render shadows, the plug-in uses shadow maps, which are images rendered from the point of view of each light source. Normally, shadow resolution is computed automatically based on the composition resolution and the quality settings of the layers. If normal resolution doesn't create the quality you want, or renders too slowly, you can adjust the shadow map resolution. For example, if shadows are blurry and the Shadow Diffusion material option is set to 0, increase the shadow map resolution. Or, if shadows render too slowly, decrease the shadow map resolution.

When a shadow-casting layer intersects another layer, sometimes a small gap occurs behind the intersection that is supposed to be shadowed. To decrease the size of the gap, increase the shadow map resolution.

Stereoscopic 3D

You can create stereoscopic 3D videos with Adobe After Effects.

For tutorials, details, and resources about stereoscopic 3D, see this article on the Adobe website.

For an overview of stereoscopic 3D workflow in After Effects, see Understanding Stereoscopic 3D in After Effects.

Mark Christiansen shows compositing stereoscopic 3D footage (using free clip from Art Beats).

Stereoscopic 3D camera rig

After Effects has a Create Stereo 3D Rig menu command, allowing you to turn a 3D composition into a stereoscopic 3D composition. The Stereo 3D Rig creates all the elements for you, including the 3D Glasses effect.

Make a stereoscopic 3D camera rig by first creating a composition with 3D elements in it. A composition that contains items such as a 3D collapsed precomposition or 3D elements in the composition itself works well. If you already have a camera in use, you can select it when creating the stereoscopic 3D camera rig. If no camera is selected, then a new camera (named Master Cam) is created. Choose Layer > Camera > Create Stereo 3D Rig. The rig only works with two-node cameras.

The rig is produced by creating a master camera or by using the existing selected camera in the composition. There are left eye [compare Left Eye] and right eye [compare Right Eye] compositions. Each composition has a camera linked to the master camera, the original composition nested in them, and an output stereo 3D composition [compare Stereo 3D]. The output stereo 3D composition nests both eye compositions and contains a layer called Stereo 3D Controls. This layer contains a Stereo 3D Controls effect for controlling the rig and a 3D Glasses effect that combines the left and right eye compositions into a stereo image. (See .)

Note:

The Stereo 3D Controls effect is an effect built as part of the Stereo 3D Rig and does not reside in the Effects and Presets panel.

The Stereo 3D Controls effect has the following settings for Camera Separation and Convergence:

Configuration *Center* places the left and right camera on either side of the master camera. *Hero Left* places the left camera in the same spot as the master camera with the right camera to the right. Conversely, *Hero Right* places the right camera at the master camera position with the left camera to the left.

Stereo Scene Depth Controls the interaxial separation between the cameras as a percentage of the composition's width. That way, if the composition is resized, the separation amount is constant. This setting starts low at a value of 3% to keep the effect subtle. Ideally, this value does not need to increase to more than 14%-30% for reasonable 3D footage. However, it can be bigger depending on the scene content (objects are very close together) and the camera field of view, for example.

Note:

Changing this value affects the depth to which the Stereo 3D goes in and out of the scene. Pushing the value too high can cause eye strain.

Converge Cameras When off, the cameras remain parallel to the master camera but offset to either side. When on, the position remains offset. However, the Point of Interest of the left and right cameras are joined at the location based on the following two properties.

Converge To and Convergence Z Offset Determines the Z distance away from the camera that the screen appears to be when looking through 3D glasses. Everything farther in Z space appears to be pushed into the screen, and everything closer appears to pop out of the screen. When working without converge the cameras check box on, and cameras are parallel, changing the scene convergence has the same effect as changing the Z offset. Use difference mode to set different elements in the scene to screen space in that case. (See .)

Getting started with stereoscopic 3D

If you are working with stereoscopic 3D, you don't necessarily need a 3D television. For example, you can use anaglyph (red-cyan) 3D glasses and view 3D stereoscopic footage right in the Composition panel. However, you can use a 3D television for doing live editing with a 3D television and active shutter glasses, as well. For that workflow, you need a few things before getting started:

- A monitor or television that supports 3D stereoscopic viewing.
- Glasses for viewing stereoscopic 3D television.

Note:

For this workflow, use active shutter glasses that require an emitter device. Make sure that you are using the glasses that the television manufacturer recommends.

- Stereoscopic footage or a 3D composition.

Once you have gathered these items, do the following:

1. Connect the 3D TV to your computer with an HDMI cable (DVI is acceptable if HDMI is not available).
2. Create a 3D composition in After Effects. Make sure that the composition size matches the current resolution of your output monitor.
3. Make a new Composition panel for your Stereo 3D composition. Lock the composition, and then drag it to your 3D TV monitor.
4. Ensure that the Composition panel is set to 100%.
5. Type Control + \(backslash) twice to set the composition to full screen for the 3D TV. Set the dimensions of the composition and the 3D TV to be the same.

6 Switch the 3D view in the 3D Glasses effect to one of the following:

- Stereo Pair
- Over Under
- Interlaced

7 Turn on 3D mode for your 3D TV and match the format to what was set in 3D View for the 3D Glasses effect. (Stereo Pair, and Over Under are supported on most 3D TVs.

8 Put on your 3D glasses, and edit your composition in true stereoscopic 3D.

Stereoscopic 3D tips

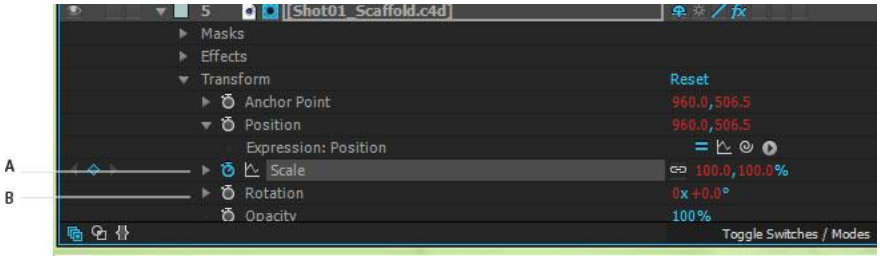
- If you are working with3D stereoscopic footage in the Composition panel and you do not have a 3D television, you can work with the anaglyph format. Ordinary red and cyan anaglyph 3D glasses work best for this 3D stereoscopic workflow.
- Increase or decrease Stereo Scene Depth to change how deep the 3D environment appears.
- Turn on Converge Cameras and change the Convergence Z Offset to move different objects behind and in front of the screen. Objects closer to the camera than the Z offset appears in front of the screen, objects farther away appears behind it.
- You can make your composition's depth of field to match your stereoscopic camera's convergence by doing one of the following:
  - When using "Link Focus Distance to Point of Interest" on the master camera, and converge cameras for the rig, the depth of field and stereoscopic 3D convergence matches.
  - If you want the depth of field to change over time, you can animate the focus distance of the master camera. Then, set the convergence point to converge from "Camera Position", and set an expression linking the convergence Z offset to the master camera's Focus Distance

Chapter 7: Animation and keyframes

Animation basics

About animation, keyframes, and expressions

Animation is change over time. You animate a layer or an effect on a layer by making one or more of its properties change over time. For example, you can animate the Opacity property of a layer from 0% at time zero to 100% at time 1 second to make the layer fade in. Any property with a stopwatch button to the left of its name in the Timeline panel or Effect Controls panel can be animated.



Stopwatch icons
***A** Active stopwatch **B** Inactive stopwatch*

You animate layer properties using keyframes, expressions, or both.

Many animation presets include keyframes and expressions so that you can simply apply the animation preset to the layer to achieve a complex animated result.

You work with keyframes and expressions in After Effects in one of two modes: *layer bar mode* or *Graph Editor mode*. Layer bar mode is the default, which shows layers as duration bars, with keyframes and expressions aligned vertically with their properties in the Timeline panel. Graph Editor mode does not show layer bars, and shows keyframes and expression results in value graphs or speed graphs. (See The Graph Editor.)

Keyframes

Keyframes are used to set parameters for motion, effects, audio, and many other properties, usually changing them over time. A keyframe marks the point in time where you specify a value for a layer property, such as spatial position, opacity, or audio volume. Values between keyframes are interpolated. When you use keyframes to create a change over time, you typically use at least two keyframes—one for the state at the beginning of the change, and one for the new state at the end of the change. (See Set or add keyframes.)

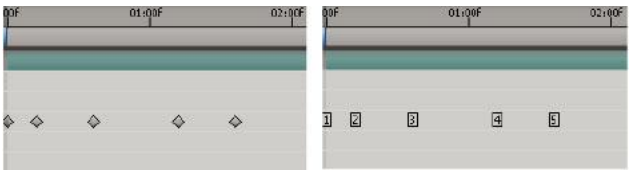
When the stopwatch is active for a specific property, After Effects automatically sets or changes a keyframe for the property at the current time whenever you change the property value. When the stopwatch is inactive for a property, the property has no keyframes. If you change the value for a layer property while the stopwatch is inactive, that value remains the same for the duration of the layer.

Note:

When Auto-keyframe mode is on, the stopwatch is activated automatically for a property when it's modified. (See Auto-keyframe mode.)

If you deactivate the stopwatch, all keyframes for that layer property are deleted, and the constant value for the property becomes the value at the current time. Don't deactivate the stopwatch unless you're sure that you want to permanently delete all of the keyframes for that property.

Change the keyframe icons in layer bar mode to numbers by choosing Use Keyframe Indices in the Timeline panel menu.



Keyframes as icons compared to keyframes as numbers

Note:

When a layer property that contains keyframes is collapsed, gray dots (summary keyframe indicators) for the property group show that there are keyframes contained within it.

Some tools, such as Motion Sketch and the Puppet tools, automatically set keyframes for you to match motion that you sketch.

Expressions

Expressions use a scripting language based on JavaScript to specify the values of a property and to relate properties to one another. You can create simple expressions by connecting properties with the pick whip. (See About expressions.)

Online animation resources

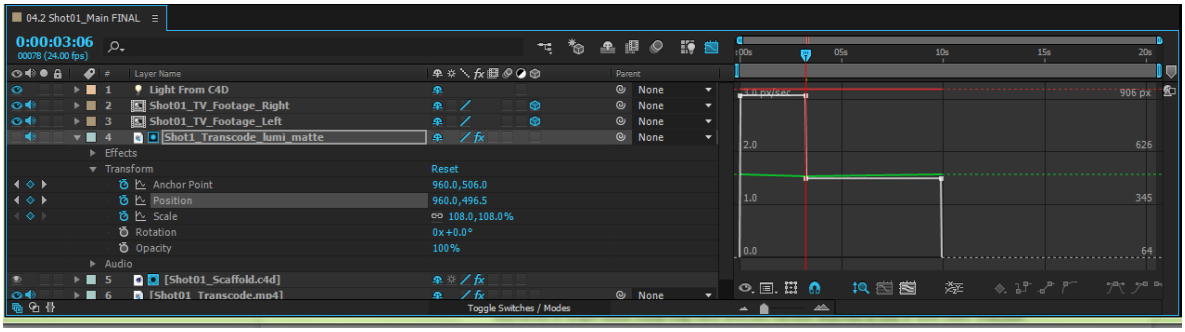
See the video tutorial, "Animating Transform Properties With Keyframes," by Jeff Sengstack and Infinite Skills.

For a step-by-step tutorial that demonstrates the animation of individual layers from a Photoshop (PSD) file, see the "Animating Layers in After Effects" chapter of the After Effects Classroom in a Book on the Peachpit Press website.

The Graph Editor

The Graph Editor represents property values using a two-dimensional graph, with composition time represented horizontally (from left to right). In layer bar mode, on the other hand, the time graph represents only the horizontal time element, without showing a graphical, vertical representation of changing values.

To toggle between layer bar mode and Graph Editor mode, click the Graph Editor button in the Timeline panel or press Shift+F3.



Two animated properties (Position and Scale) shown in the Graph Editor

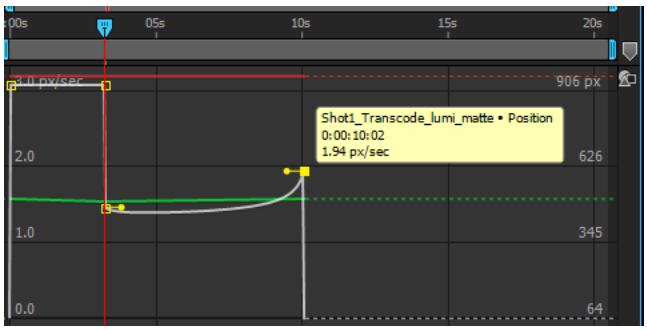
Two types of graphs are available in the Graph Editor: value graphs, which show property values; and speed graphs, which show rates of change of property values. For temporal properties, such as Opacity, the Graph Editor defaults to the value graph. For spatial properties, such as Position, the Graph Editor defaults to the speed graph. For information on viewing and editing keyframe values, see View or edit a keyframe value.

In the Graph Editor, each property is represented by its own curve. You can view and work on one property at a time, or you can view multiple properties simultaneously. When more than one property is visible in the Graph Editor, each property's curve has the same color as the property's value in the layer outline.

When you drag a keyframe in the Graph editor with the Snap button selected, the keyframe snaps to keyframe values, keyframe times, the current time, In and Out points, markers, the beginning and end of the work area, and the beginning and end of the composition. When the keyframe snaps to one of these items, an orange line appears in the Graph Editor to indicate the object you're snapping to. Hold Ctrl (Windows) or Command (Mac OS) after you've begun dragging to temporarily toggle snapping behavior.

Keyframes in Graph Editor mode may have direction handles attached to one or both sides. Direction handles are used to control Bezier interpolation.

You can use the Separate Dimensions button at the bottom of the Graph Editor to separate the components of a Position property into individual properties—X Position, Y Position, and (for 3D layers) Z Position—so that you can modify or animate each independently. (See Separate dimensions of Position to animate components individually.)



Keyframes in the Graph Editor with direction handles

Online resources about the Graph Editor

Antony Bolante provides information, tips, illustrations about using the Graph Editor in an article on the Peachpit Press website.

Specify which properties are shown in the Graph Editor

? Click the Show Properties button at the bottom of the Graph Editor, and select from the following options:

Show Selected Properties Displays selected properties in the Graph Editor.

Show Animated Properties Displays animated properties of selected layers in the Graph Editor.

Show Graph Editor Set Displays properties that have the Graph Editor switch selected. This switch is next to the stopwatch, to the left of the property name, when the stopwatch is active—that is, when the property has keyframes or expressions.

Graph options in the Graph Editor

Click the Graph Type And Options button at the bottom of the Graph Editor to select from the following options:

Auto-Select Graph Type Automatically selects the appropriate graph type for a property: speed graphs for spatial properties (such as Position), and value graphs for other properties.

Edit Value Graph Displays the value graph for all properties.

Edit Speed Graph Displays the speed graph for all properties.

Show Reference Graph Displays the unselected graph type in the background for viewing only. (The gray numbers to the right of the Graph Editor indicate the values for the reference graph.)

Show Audio Waveforms Displays the audio waveform for any layer that has at least one property in the Graph Editor.

Show Layer In/Out Points Displays In and Out points of all layers that have a property in the Graph Editor. In and Out points appear as curly braces.

Show Layer Markers Displays layer markers in the Graph Editor, if they exist, for any layer that has at least one property in the Graph Editor. Layer markers appear as small triangles.

Show Graph Tool Tips Toggles the graph tool tips on and off.

Show Expression Editor Shows or hides the expression editor field.

Allow Keyframes Between Frames Allows placement of keyframes between frames for fine-tuning animation.

Pan and zoom in the Graph Editor

- To pan vertically or horizontally, drag with the Hand tool

To activate the Hand tool momentarily when using another tool, press and hold the spacebar or the middle mouse button.

- To pan vertically, roll the mouse scroll wheel.
- To pan horizontally, press the Shift key as you roll the mouse scroll wheel.
- To zoom in, click with the Zoom tool.
- To zoom out, Alt-click (Windows) or Option-click (Mac OS) with the Zoom tool.
- To zoom using the mouse scroll wheel, press Alt (Windows) or Option (Mac OS) while scrolling to zoom horizontally. Press Ctrl (Windows) or Command (Mac OS) to zoom vertically.
- To zoom horizontally, Alt-drag (Windows) or Option-drag (Mac OS) to the left with the Zoom tool to zoom out or to the right to zoom in.
- To zoom vertically, Alt-drag (Windows) or Option-drag (Mac OS) up with the Zoom tool to zoom in or down to zoom out.

Note:

You cannot pan or zoom vertically when Auto Zoom Height is selected.

Auto Zoom Height and Fit

Auto Zoom Height

Toggles Auto Zoom Height mode, which automatically scales the height of the graph so that it fits the height of the Graph Editor. The horizontal zoom must still be adjusted manually.

Fit Selection

Adjusts the value (vertical) and time (horizontal) scale of the graph to fit the selected keyframes in the Graph Editor.

Fit All

Adjusts the value (vertical) and time (horizontal) scale of the graph to fit all of the graphs in the Graph Editor.

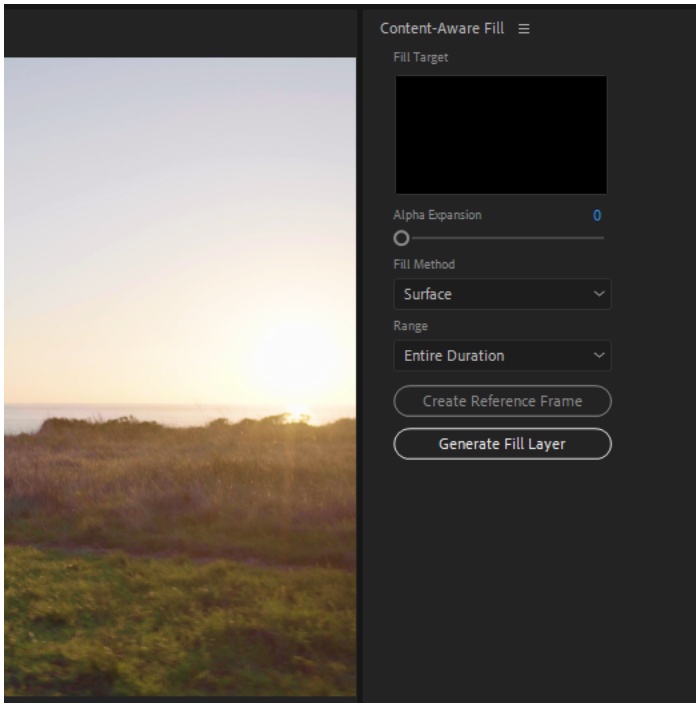
Remove objects from your videos with the Content-Aware Fill panel

Removing an unwanted object or area from a video can be a time-consuming and complex process. With the Content-Aware Fill feature, you can remove any unwanted objects such as mics, poles, and people from your video with a few simple steps. Powered by Adobe Sensei, this feature is temporally aware, so it automatically removes a selected area and analyzes frames over time to synthesize new pixels from other frames. Simply by drawing mask around an area, After Effects can instantly replace it with new image detail from other frames.

The tool gives you the option to help get the fill to blend seamlessly with the rest of the image. The Content-Aware Fill panel contains various options to help you remove unwanted objects and fill transparent areas.

The Content-Aware Fill panel

To open the content aware fill panel, select **Windows > Content Aware Fill**.



The Content-Aware Fill panel

- **Fill Target**: This is the preview of the area that Content-Aware Fill analyzes. The transparent area is outlined in pink.
- **Alpha Expansion**: Use this to increase the size of the area to fill. Content-Aware Fill does not require precise masking, and may offer better results when the area includes pixels outside the object being removed.
- **Fill Method**: Choose the type of fill to render:
  - **Object**: Removes an object from the footage. It fills the transparent area by taking pixels from the current and surrounding frames. It removes an object from the footage. It estimates the motion of the scene behind the object and uses this to find appropriate color values. For best results, use this to replace moving objects, like a car on a road.
  - **Surface**: Replaces the surface of an object. It works similar to **Object** as it takes pixels from surrounding frames but uses the motion estimated in the comp under the transparent area. For best results, use this for static and flat surfaces, like a stain on a shirt, or a sign on a building.
  - **Edge Blend**: Blends surrounding edge pixels. It fills the transparent area by sampling pixels at the edges of the transparent area and blending them together, and renders fast. For best results, use this to replace static objects on surfaces that lack texture, like text on paper.
- **Range**: Choose whether to render the fill layer for only the work area or the entire duration of the composition. Setting it to work area restricts Content-Aware fill from pulling in content outside of the work area.
- **Create Reference Frame**: Creates a single-frame fill layer frame and opens it in Photoshop. Use reference frames to help Content-Aware Fill learn what the fill layer should look like. For example, if you have a video with complex background and Content-Aware Fill is unable to give you desired results, use the tools in Photoshop such as clone, and patch to create a better result on the reference frame. Once done, generate a new fill layer. Content-Aware Fill transfers the pixels from the reference frame to new frames in the fill layer. For some shots, you can create multiple reference frames at frames where the lighting or camera angle changes. Note that you can also use any-other process to create single-frame layers to guide content aware fill. It also respects content in those layers as a guide. This is a shortcut to do that.

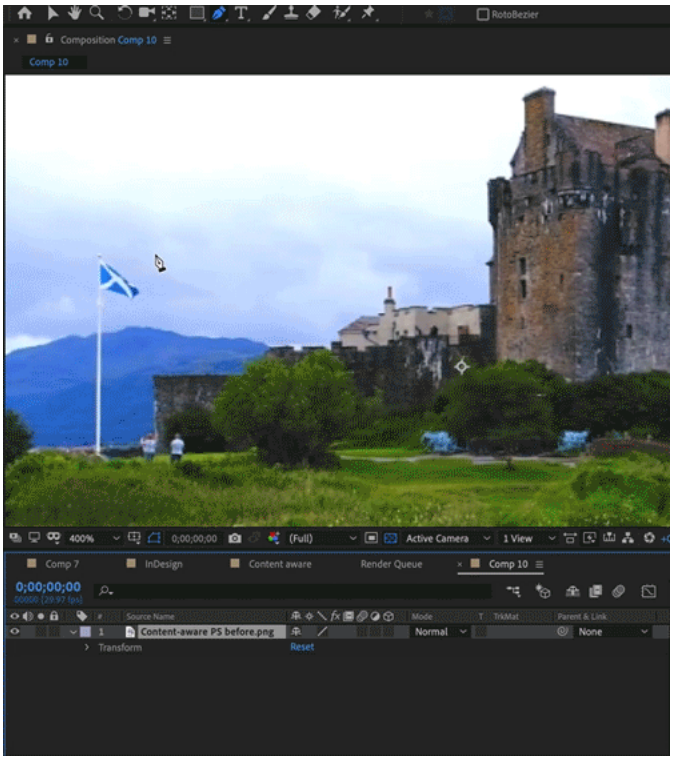
- **Generate Fill Layer**: Creates a new fill layer. Analysis and rendering progress are displayed at the bottom of the panel. Content-Aware Fill prioritizes analyzing and rendering the frame under the Current-Time Indicator (CTI). While the fill is being rendered, you can move the CTI to a different frame to prioritize that frame, which can help you decide whether the results look correct before the entire fill layer is generated.

How to use Content-Aware Fill

The Content-Aware Fill panel includes multiple features to enable precise removal of unwanted objects from your vidoe. But all these features may not be useful in every situation.

Here is a summary of the steps you need to follow to use the Content-Aware Fill feature:

1 Use any available method to create transparent areas in your composition. For example, draw a mask around an object or area of your composition that you want to replace, and set it to Subtract mode. To learn how to create masks, see Creating shapes and masks.



Create a mask around an object

2 Open the **Content Aware Fill** panel with **Windows > Content Aware Fill**.

3 In the Content-Aware Fill panel, select the **Fill Method** and click **Generate Fill Layer**. Generate fill adds a **Fill** layer on top of the selected layer in the **Timeline** panel. The layer contains sequences of images that After Effects analyzes while it generates fill layer.Link

You can use the following examples to see how the different settings work in different situations:

Example 1: Footage with moving camera

1 Use the Pen tool and draw a mask around the boat. For best results, draw the mask close to the object but leave some space around it for After Effects to analyze the frames better. You can use the following steps to draw a simple mask:

   1. In the **Timeline** panel, select the layer and select the Pen tool.
   2. Click key points along the shape that you want to mask. To close the mask, click again on the start point.
   3. Adjust the mask point by using the Selection tool. Click and drag points to adjust them.
   4. If you want the mask to have refined curves, click around each mask point to adjust the curve.
   5. Once the masking is done, select **Subtract**.
   6. Since it is a moving footage, track the mask so it moves with the boat. Right-click the mask layer, and select **Track Mask**. To learn more, see Mask Tracking.

2 In the Timeline panel, right-click the layer and setting the mask mode to **Subtract**. After Effects creates a transparent area in place of the boat.

3 To open the content aware fill panel, select **Windows > Content Aware Fill**.

4 The panel displays multiple options. For a detailed list of the panel options, see The Content Aware Fill panel. Use the following settings:

   - Set the **Fill Method** to **Object**.
   - Set the Range to Entire duration.

5 Click **Generate Fill Layer**. After Effects analyzes each frame and fills the transparent area, and adds a **Fill layer** to the timeline panel. The layer contains the resulting sequence of images that After Effects has analysed. The name of the layer displays the number of images in that sequence.

This fill method is best used on footage with moving camera as it replaces the object entirely with what is behind it. It fills the transparent area by taking pixels from the current and surrounding frames, and outputs a seamless looking frame.

Example 2: Footage where the background is a flat surface without much detail

1 Use the first three steps in the Example 1: Footage with moving camerasection to mask the areas to be replaced.

2 Select **Window > Content-Aware Fill.**

3 Set **Fill Method** to **Surface**, and **Range** to **Work area**.

4 **Fill Target** displays the transparent area to be filled. Click **Generate Fill Layer** and let After Effects render the frames.

Example 3: Work with your footage in Photoshop

There can be footage where Content-Aware Fill alone may be unable to achieve the desired results. For example, a footage with water or areas where there is varied light and texture. In such situations, you can take advantage of the Adobe Photoshop tools such as Clone Stamp to finetune your footage.

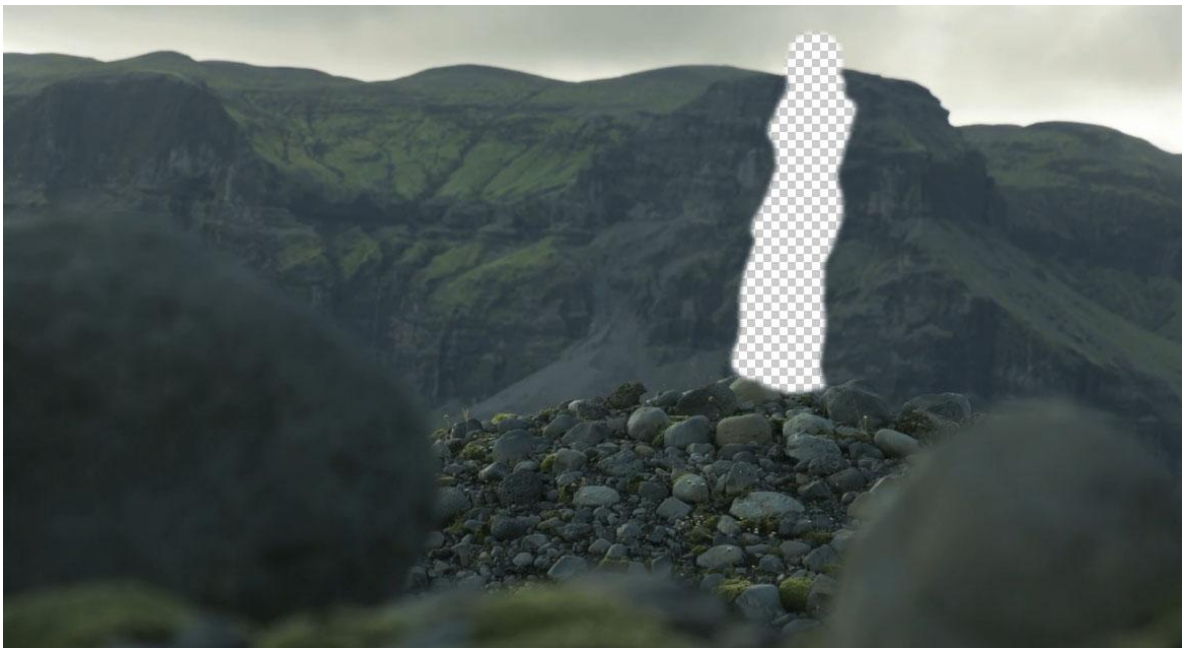
Workflow to create reference frame in After Effects and take it into Photoshop for editing

Note:

Make sure you have Photoshop installed on your machine.

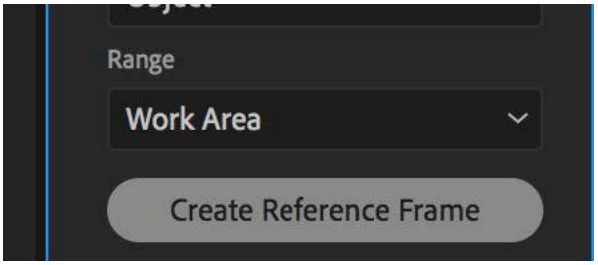
In the above example, we remove the girl from the footage where the background has varied light and texture.

1 Follow the steps in the above example to mask the girl in the footage. Set the **Fill method** to **Object**.



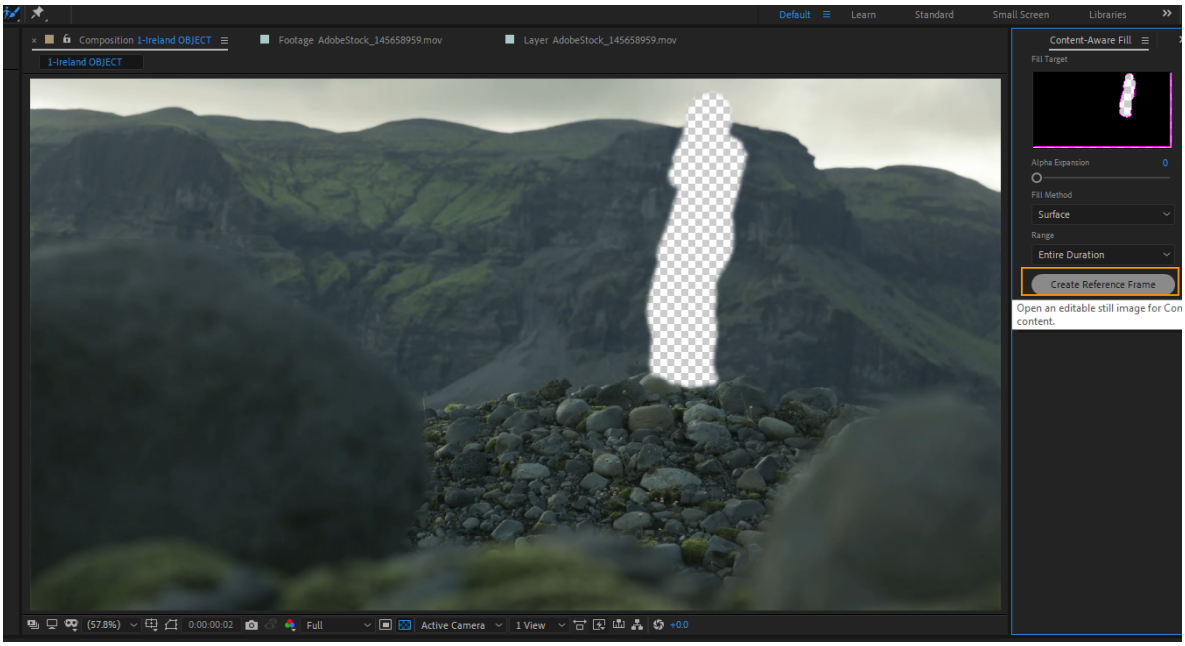
Frame with the girl masked out

2 After you mask, use the **Create Reference Frame** option in the Content-Aware Fill panel.

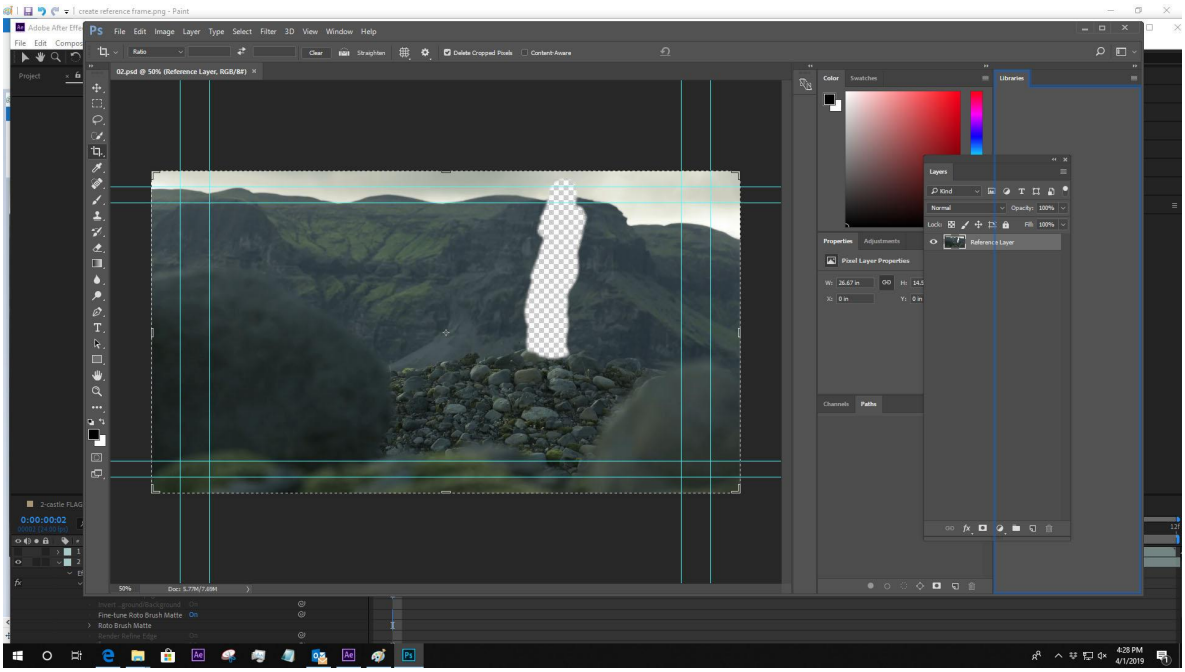


Click Create Reference Frame

3 To make a Reference Frame, after you create a mask, select a frame where the object is largest in your shot. In this example, use the first frame. Click the **Create Reference Frame** button to send that frame (with its mask) to Photoshop. A reference frame is a user-painted single-still clean plate to teach the Content-Aware Fill algorithm what pixels to fill in your masked area.



Click Create Reference Frame after masking

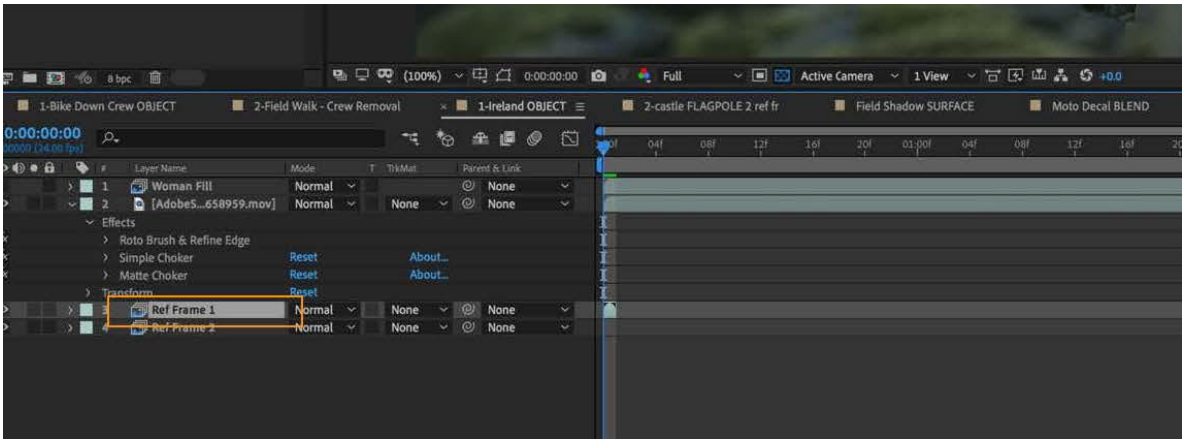


Open reference frame in Photoshop

4 Paint in the fill in any way that works for you. For this example, use the Clone Stamp tool to get finer results. After you make the edits, save the footage. Reopen After Effects, and the **Content Aware Fill** panel places your reference frame on a layer below your original shot. This layer updates with your saved paint job from Photoshop, and fills the object mask for that frame only with your Photoshop Reference Frame.

Another tool you can use is the Photoshop Content Aware Fill.

To learn about the different Photoshop tools, see Remove objects from your photos with Content-Aware Fill, and Retouch and repair photos.



Reference Frame layer in the Timeline panel

5 Click the Generate Fill Layer button to render Content Aware Fill that references your fixed frame.

Content-Aware Fill settings

To open the Content-Aware Fill Settings dialog, click the menu icon (three bars) in the title bar of the Content-Aware Fill panel, and choose Content-Aware Fill Settings.

- **Output Depth**: The color depth, in bits per channel (8-, 16-, or 32-bpc), used to write the fill layer sequence files. By default Output Depth inherits the project's color depth.
- **Output Location:** Choose where After Effects After Effects saves the fill layer sequence files. By default the files are saved to a folder named Fills in the same folder as the project file.
- **Path Type**: Project Relative saves the files to a location relative to the project file. Absolute specifies the full path to the folder.
- **Path**: The path to the folder. For Absolute, this is the full path to the folder. For Project Relative, this specifies the path relative to the project file. A single dot (.) in the path represents the folder where the project file is located. Use two dots (..) to go up or down one level.
- **Create Photoshop Reference Frame**: Saves reference frames as a PSD file, and opens it in Photoshop. Enabled by default. If disabled, saves the reference frame as a PNG (8- or 16-bpc) or EXR (32-bpc) file and opens it in the system default application for those file types.
- **Create Photoshop Sequence for Output**: Saves fill layer sequences as PSD files. Disabled by default. If disabled, fill layer sequences are saved as PNG (8- or 16-bpc) or EXR (32-bpc) files.
- **Auto-manage Unused Fill Footage**: When a new fill layer is generated, you will be asked if you want to delete fill layer footage not being used in a composition. Disabled by default.

Delete Unused Fill Footage

To manually delete fill layer footage that is not being used by a composition, click on the menu icon (three bars) in the title bar of the Content-Aware Fill panel, and choose Delete Unused Fill Footage.

Important points and tips

- You can select an area in a footage using using any method that creates transparency, including:
  - Mask
  - Rotobrush
  - Eraser tool
  - Keying method such as Keylight method
  - Keyframing
- If you have 4K footage in an HD comp, use footage that is already scaled down via transcoding for better performance.
- Remove more complicated items in sections. For example, you can remove a person and their shadow separately more effectively than removing both at once.
- Smaller masks take less time to process over larger ones.
- The feature might give different results for a complex moving texture like water or areas where there is varied light and texture.
- If the mask is feathered, Content-Aware Fill blends in the filled region with the original content based on this alpha value (semi transparency). This is very useful when you use the panel, it causes a noticeable boundary between the filled region and the original content

- Generate Fill Layer renders sequences of images that are placed in the Timeline. These files may take up considerable space on the hard drives, depending on the kind of footage, and duration of your sequence.
- In certain cases, Content-Aware fill alone may be unable to remove object with precision. To improve results, create a reference frame and take it into Photoshop, and use the tools there to fine-tune the results.
- At the time of shooting a footage, consider the background and the foreground of your composition to reduce editing time during post-production.

Construct VR environments in After Effects

After Effects offers native support for editing your VR 360 and VR 180 videos. You can use a host of dynamic transitions, effects, and titles to edit and enhance the immersive video experience. You can experiment with the different VR 360 and VR 180 tools in After Effects for a seamless post-production workflow.

Work with VR tools in After Effects

Work with VR tools in After Effects

Note:

When you work with VR, you could run into memory limitations indicated by a banner that states - ***Requires GPU Acceleration****. By default, Adobe video applications require approximately 1GB of memory for every 1K of horizontal resolution when working in VR. In After Effects 2018, you can reduce the requirements, called* ***Aggressive Memory Management****. To enable the setting, select* ***Preferences > Previews > GPU Information > Aggressive GPU memory use (for VR)****.*

Tools to construct VR environments

The following are tools in After Effects you can use to edit your VR 360 and VR 180 videos:

The VR 360 and VR 180 tools in After Effects automate complex compositions and workflows for a seamless 360 production. These tools provide accurate results and reduce editing time.

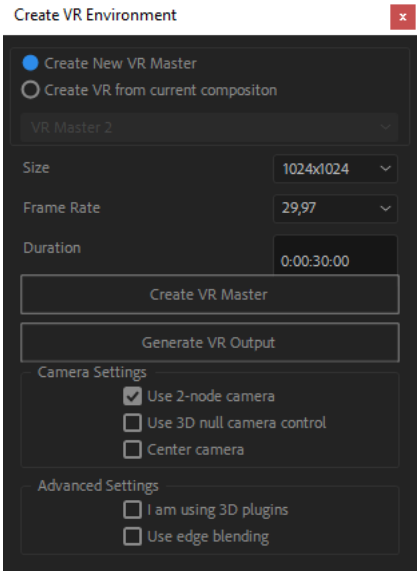
Create VR Environment

Create VR Environment automates the process of comp creation and camera relationship setup. You can use it to automate aspects of VR authoring environment in After Effects.

Work with Create VR Environment

Work with **Create VR Environment** using the following steps:

1. To launch **Create VR Environment**, select **Composition > VR > Create VR Environment**.
2. In the **Create VR Environment** dialog, if you want to create a VR master from scratch, choose the **Size** of your master (1024x1024 works for most of the VR compositions). Set the **Frame Rate** and **Duration** of your VR Master, and click **Create VR Master**.

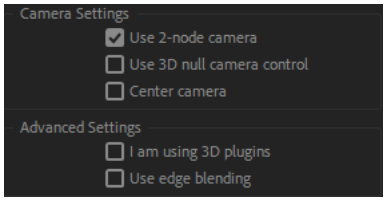


Create VR Environment

3 In the **Composition** window, change the view to Custom View 1 and create your immersive video. You can select from the various immersive video and other effects in the **Effects & Presets** panel.

4 Once you are ready with your composition, open the **Create VR Environment** dialog and click **Generate VR Output**. After Effects creates all the compositions, expressions, and adds cameras and distortions required to create a Cubic Map.

5 To modify your VR Master and apply the changes to your VR comp, click **Refresh VR Output** in the **Create VR Environment** dialog. After Effects deletes all comps and recreates them based on the modifications, you made to your VR master.



VR output settings

Camera Settings:

- **Use 2-node camera**: Select the option if you want to use a 2-node camera.
- **Use 3D Null camera Control**: Select the option if you want to control your SkyBox Camera via a 3D Null layer.
- **Center camera**: Select the option if you want to center-align the camera.

Advanced settings:

- **I am using 3D plugins**: Select the option if you are using 3D plug-ins.
- **Use edge blending**: Select the option when you use plugins that are not true 3D plug-ins.

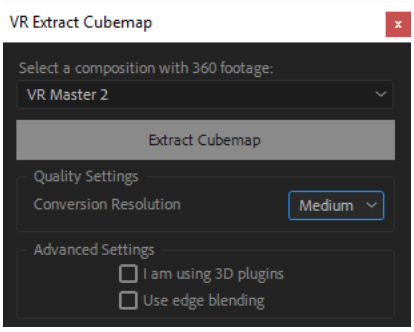
Extract Cubemap

Extract Cubemap removes equirectangular distortion from 360-degree footage and extracts six separate camera views. The six camera views are positioned in a cube formation. You can do motion-tracking, object removal, add motion graphics, and vfx to the composition.

Work with Extract Cubemap

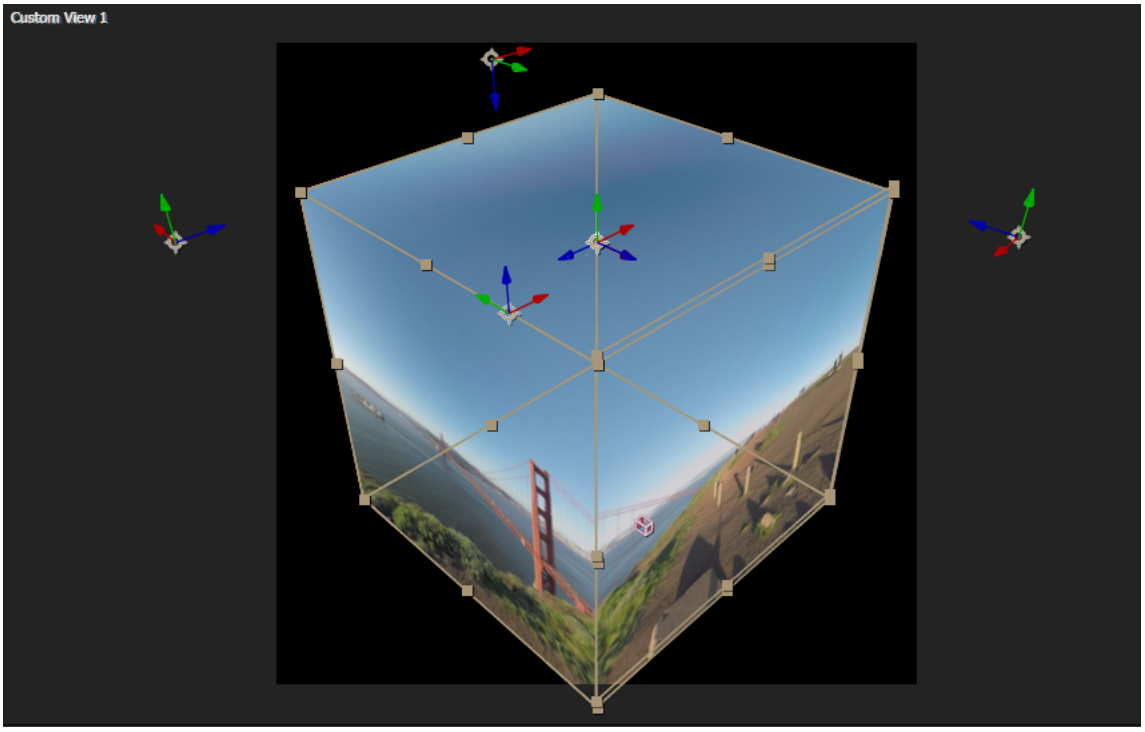
Work with **Extract Cubemap** using the following steps:

1. To launch **VR Extract Cubemap**, select **Composition > VR > Extract Cubemap**.
2. In the **VR Extract Cubemap** dialog, select a composition from the drop-down list, choose **Conversion Resolution**, and click **Extract Cubemap**.

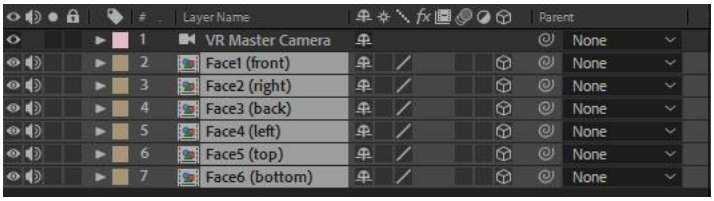


Extract Cubemap

3. After Effects generates a cubemap output for your VR composition. **Extract Cubemap** adds a **VR Master Camera** along with six more camera views that are attached to the master camera. Six camera faces are also generated that strategically form a cube.



Six faces that form the cube



Six faces in the Timeline panel

Adobe Immersive Environment

The Adobe Immersive Environment in After Effects allows you to preview how your 360 and 180 degree footage looks like in a VR head-mount display (HMD).

Supported VR headsets

After Effects supports the following VR headsets:

- Oculus Rift (Windows only)
- HTC Vive (On Mac and Windows)
- Windows Mixed Reality (Windows only)

To use your VR headsets, ensure that your system meets the VR system requirements, and install SteamVR application. SteamVR is a virtual reality system that you need whether you are using the HTC Vive or Oculus Rift. For more information, visit the SteamVR support page, and refer to the documentation that came with your headset.

Install and setup Steam

To install Steam, use the following steps:

1 Go to store.steampowered.com/about, and click **Install Steam Now**. To install, follow the installer instructions.

2 In Steam, create an account, or log into an existing one.

3 From within Steam, download and install SteamVR.

Note:

If you are using a Windows Mixed Reality HMD, within Steam, download and install Windows Mixed Reality for SteamVR.

4 From within Steam, click **Run Room Setup** to set up your room.

For more information, see the Steam documentation: Room Setup and SteamVR Tutorial.

Install VR headsets

To install:

- **HTC Vive:** Follow the instructions that come with your HTC Vive headset.
- **Oculus Rift:** For information on downloading and installing Oculus Rift, see the Oculus Rift documentation.

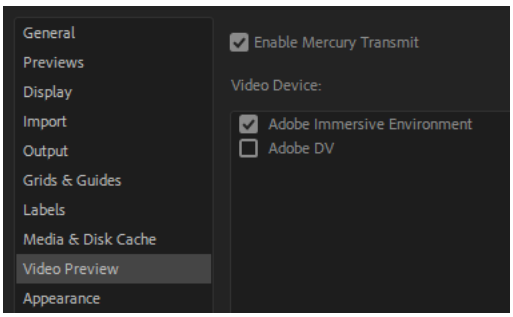
To install any handheld controllers, follow instruction that come with your controllers.

Enable Adobe Immersive Environment in After Effects

Before you enable Adobe Immersive Environment, ensure that your headsets and controllers are working fine in SteamVR.

1 In After Effects, select **Preferences > Video Preview**.

In the **Preferences** dialog, enable the **Enable Mercury Transmit** option. In the **Video Device** section, enable the **Adobe Immersive Environment** option.



Enable Adobe Immersive Environment

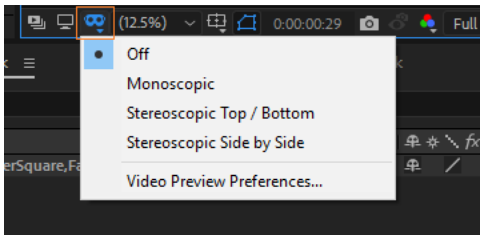
Preview footage in your headset

Click the **Adobe Immersive Environment** menu in the **Composition** panel and choose the viewing option from the following options:

- **Theater Mode (Rectilinear)**: Previews the composition as a flat rectangle in an empty room, simulating the view of looking at a movie screen.
- **360 Monoscopic**: Previews the composition as a monoscopic 360-degree field of view image.

- **360 Over/Under**: Previews the composition as a stereoscopic 360-degree field of view image. Assumes over/under layout in the composition.
- **360 Side-by-Side**: Previews the composition as a stereoscopic 360-degree field of view image. Assumes side-by-side layout in the composition.
- **180 Over/Under**: Previews the composition as a stereoscopic 180-degree field of view image. Assumes over/under layout in the composition.
- **180 Side-by-Side**: Previews the composition as a stereoscopic 180-degree field of view image. Assumes side-by-side layout in the composition.

The Video Preview Preferences options allows you to configure your preferences. To turn off preview to your HMD, disable **Adobe Immersive Environment** in **Preferences > Video Preview**.



Select option to preview footage in headset

Add responsive design to your graphics

The Responsive Design - Time feature allows you to author adaptive motion graphics. The feature enables adaptive time-stretching when a composition is nested or when it is exported as a Motion Graphics template. Adaptive time-stretching means that the the protected regions animate in the same amount of time even if you time-stretch the unprotected regions.

You can protect the intros, outros, and any arbitary region of a composition, and save the responsive design templates and reuse them in different projects to avoid duplicating and retiming.

With this feature, the animation pins to the graphic or sequence and adapts to the edits you make to them. This enables you to create complex animations and Motion Graphics templates that can responsively retime to align with a sequence in a project.

For example, you create a lower third and animate fade in/out and add responsive design-time. Responsive design preserves the animation time regardless of when the duration of the clip is extended or trimmed.

Understand Responsive Design - Time

Take the following example to illustrate the problem:

You create a text animation with a fade-in/out and you need the animation to be as long as the sequence. The animation comprises of two sets of text that fade in against a black background.

Add the same animation to a different sequence. Every element of the animation such as the font size, and the start and end time of the fade in/out, should match with the sequence. One way is to duplicate the animation to align it with the length of the sequence. However, this approach can be time-consuming as you need to move the animation keyframes to align the fade in/out with the sequence.

This is where you can use responsive design – Time. You can protect the fade in/out regions (comprising of keyframes) and extend the animation. This attaches the regions to the sequence and the amount of time they take to animate remains unaffected even when you time-stretch the animation to match the length of the sequence. Once attached, the animation dynamically adapts to the length of the sequence.

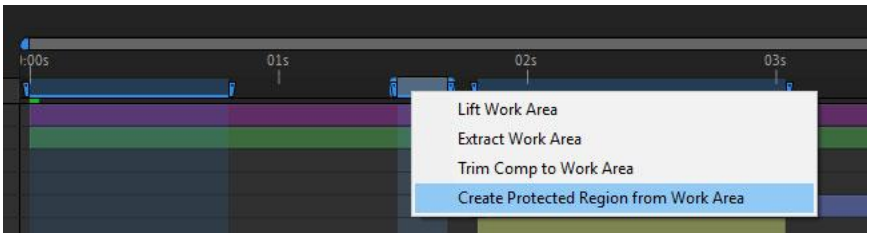
Apply Responsive Design - Time

You can apply Responsive Design – Time in the following three ways:

1 **Option 1**:

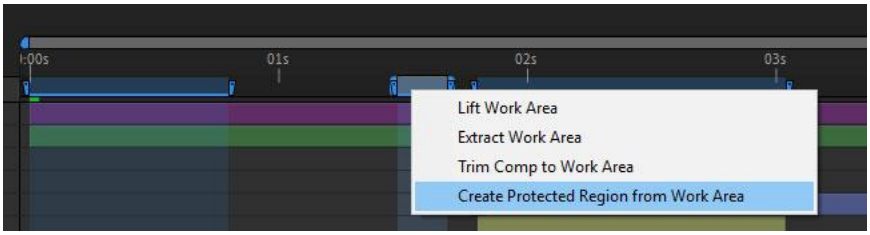
In the **Composition** menu, select one of the options from the **Responsive Design – Time** sub-menu:

- **Create Intro**: Creates a protected region for 15% of the composition duration, starts on the first frame of the composition.
- **Create Outro**: Creates a protected region for 15% of the composition duration, ends on the last frame of the composition.
- **Create Protected Region from Work Area**: Creates a protected region with start and end points that align with the work area bar. The protected regions are shaded in blue.



2 **Option 2**:

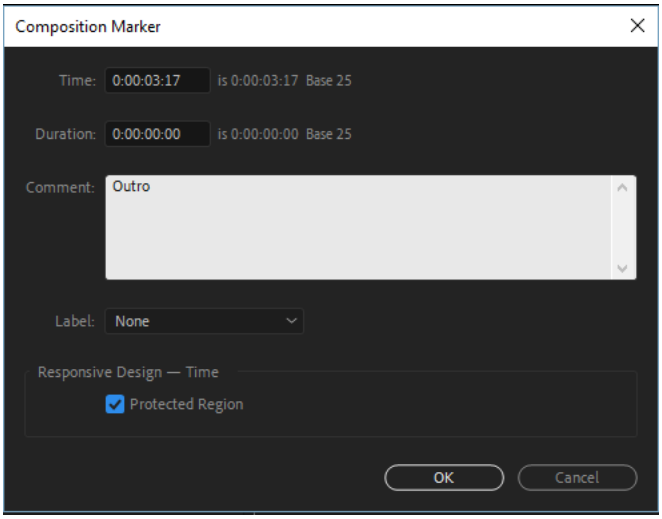
Drag the work area bar to select the region you want to set as protected region. Right-click the work area bar, then select **Create Protected Region from Work Area**.



3 **Option 3**:

Click the marker icon at the right-side of the timeline and create a composition marker.

4 In the Timeline panel, double-click the marker to open the **Composition Marker** settings dialog, and set a duration and enable the **Protected Region option**.



Add the animation to another composition

Once you set the protected regions, outros, and intros of your animation, you can add them to different compositions or sequences.

Refer to the following example to illustrate the process:

- Name the animation with protected regions, for example, Comp A.
- Name the composition you have to add the animation to, for example, Comp B.

Open Comp B in the **Timeline** panel.

1. In the timeline, drag and place the Comp A over Comp B.
2. The timeline displays the protected regions as shaded in blue. Hold the end point of Comp A and drag it to match the end point of Comp B.

   When you preview the comp, the protected regions in the animation take the same amount of time to animate and only the unprotected regions are stretched.

Work with nested composition with multiple protected regions

- When you drag the in and out points of a composition that has one or more protected regions and it is nested into another composition, it time-stretches the composition instead of trimming. The feature preserves the duration of the protected regions. For example, when you time-stretch a clip of 5 seconds that has protected regions of 2 seconds, to make it 10 seconds, the duration of the protected regions remains 2 seconds long.
- To trim the in or out point of the layer instead of time-stretching, hold the *Option* (macOS) or *Alt* (Windows) key and drag the in and out points.
- Protected regions are composition markers with the Protected Region option enabled, with different handle icons to make it easy to identify. Protected region markers behave the same as other composition markers, except that when you nest a composition with protected regions, those markers can not be modified. Instead, the layer bar for the nested composition is shaded to indicate the protected regions.
- If you modify a protected region after you nest a composition, the protected region marker on the nested composition layer does not get automatically updated. To update markers on a nested composition layer, select the layer and choose **Layer > Markers > Update Markers** from Source.

- You can also access the **Protected Region** option through scripting or expressions using the *protectedRegion* attribute of composition markers.

Export a composition with protected regions as a Motion Graphics template

When you export a composition with protected regions as a Motion Graphics template and add to a sequence in Premiere Pro, you can adust the length directly without doing time remap.

You can drag the in and out points of the clip to time-stretch the composition instead of trimming the in or out point. The duration of protected regions is preserved.

- When you export a composition containining audio as a Motion Graphics template, it does not not time stretch adaptively in Premiere Pro.
- Compositions that use the CINEMA 4D renderer and contain 3D layers, or that contain a CINEMA 4D layer that uses the CINEWARE effect, could face issues in smooth animation of non-protected regions when the composition is time-stretched.

Do more with After Effects

Create incredible motion graphics, text animation, and visual effects with Adobe After Effects. Design for film, TV, video, and web.

Apply immersive video effects

After Effects offers native immersive video effects to edit your VR 360 and VR 180 videos. You can use a host of dynamic transitions, effects, and titles to edit and enhance the immersive video experience. You can experiment with the different immersive video effects in After Effects for a seamless post-production workflow.

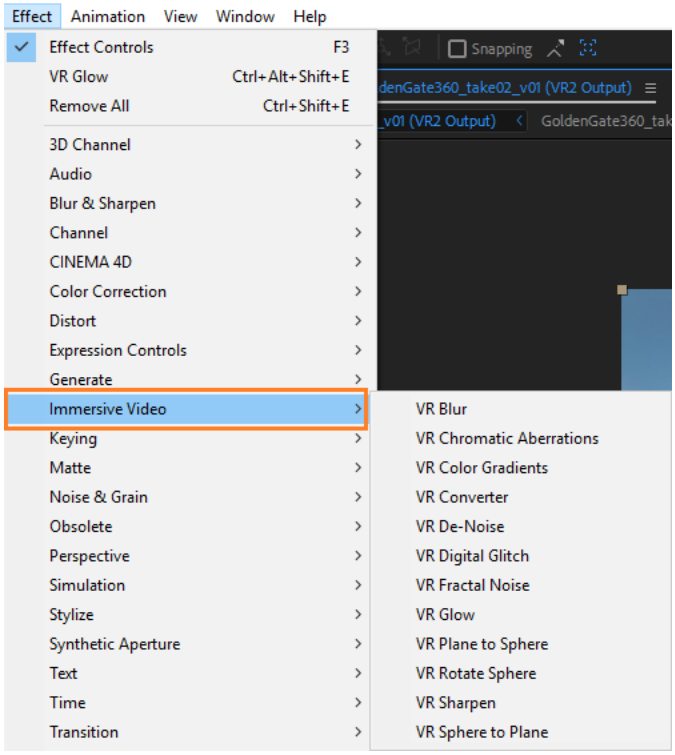
GPU requirements for immersive video effects

Immersive Video effects render using the GPU of your computer. Make sure to set your video rendering preference to GPU. To set, select **File > Project Settings > Video Rendering and Effects > Use > Mercury GPU Acceleration (OpenCL)**. If your settings are set to **Mercury Software Only**, the effects do not render and display a warning banner - **This effect requires GPU acceleration**.

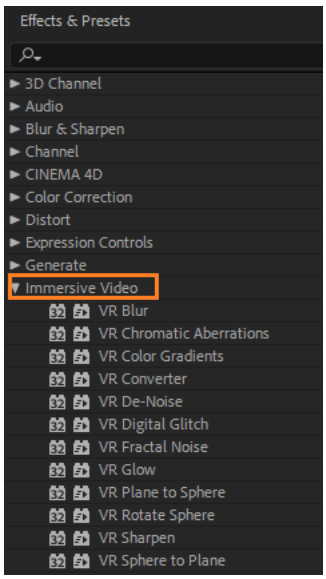
Apply seamless immersive video effects to your footage

You can use the spherically aware immersive video effects that compensate for distortion in equirectangular content.

To apply these effects, select **Effects > Immersive Video**, or search for **VR** in the **Effects & Presets** panel.



Immersive video effects under Effects tab



Immersive video effects in Effects and Presets panel

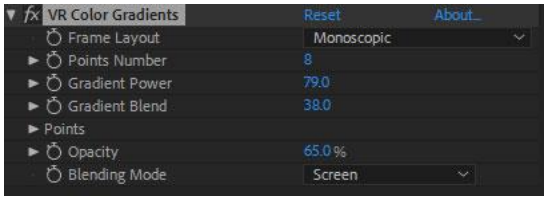
Post Effects in After Effects provide a seamless editing experience. You can apply the effects directly to the stitched 360 footage, with no distortion along the seams. You can add the following effects to your videos to enhance immersive experience:

Apply VR Color Gradients effect

Before

After

You can use the following parameters to play around with the effect on your footage:



VR Color Gradient settings

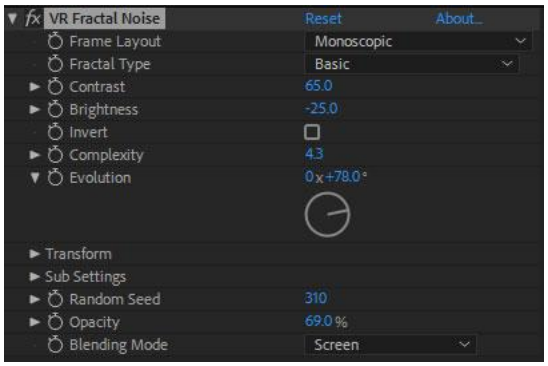
Parameter	Description
Frame Layout	Sets the frame layout as Monoscopic or Stereoscopic Over/Under.
Points Number	Adjusts the number of color points that are applied to a footage.
Gradient Power	Adjusts the overall gradient power for all the color points.
Gradient Blend	Adjusts the overall blending for all the color points. The higher the number, the more the colors begin to blend together. The blending starts at the edges and moves inwards. For example, feathering around the edges.
Points	Adjusts the Color and Point of Interest for each of your color points. Each of the Points of Interests can be moved independently and can be key-framed.
Opacity	Adjusts the opacity of the overall color gradients on your footage. At 100%, the effect is opaque. At 0%, the effect is transparent.
Blending Mode	You can select from the various color blending modes for the effect on top of your original footage. The default is Normal.
Stereoscopic Side-by-Side	The Frame Layout parameter can be set to Stereoscopic Side-by-Side, in addition to the existing Monoscopic and Stereoscopic Over/Under options.
Horizontal and Vertical Field of View	The horizontal and vertical field of view can be independently set. By default, the values are 360x180. For VR 180 content, set both values to 180.

Apply VR Fractal Noise effect

Before

After

You can use the following parameters to play around with the effect on your footage:



VR Fractal Noise setting

Parameter	Description
Frame Layout	Sets the frame layout as Monoscopic or Stereoscopic Over/Under.
Fractal Type	The parameter allows you to choose between four different fractal types: Basic, Turbulent Sharp, Max, and Strings.
Contrast	Adjusts the image contrast for the fractal noise.
Brightness	Adjusts the brightness level for the fractal noise
Invert	Inverts the color channels of the fractal noise.
Complexity	Adjusts the complexity of the fractal noise. Higher the value, more detailed fractal noise, and lower the value, less detailed fractal noise.
Evolution	The parameter allows you to use the cycling feature to animate fractal noise. Speed of cycling changes the animation.

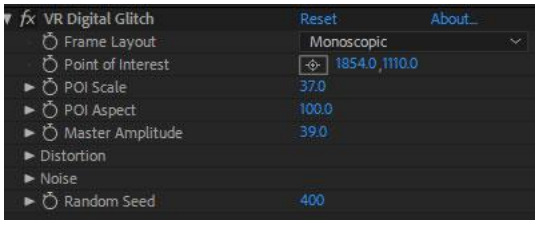
Transform	• Scale: Adjusts the overall size of the fractals on your footage. Higher the value, larger the visible fractals. • Tilt (X axis): Repositions the fractal noise on the X-axis of your footage. Pan (Y axis): Repositions the fractal noise on the Y-axis of your footage. • Roll (Z axis): Repositions the fractal noise on the Z-axis of your footage.
Sub settings	• Sub Influence: Fractal noise effect is made up of multiple fractal noise layers. Adjusts the influence the sublayer of fractal noise on the appearance. • Sub Scaling: Adjusts the influence of scaling that the sublayer of fractal noise has on the appearance. • Sub Tilt (X axis): Adjusts the position of the subscaled fractal noise layer on the X-axis of your footage. • Sub Pan (Y axis): Adjusts the position of the subscaled fractal noise layer on the Y-axis of your footage. • Sub Roll (Z axis): Adjusts the position of the sub scaled fractal noise layer on the Z-axis of your footage.
Random Speed	The parameter allows you to set a random speed of the fractal noise particles on your footage.
Opacity	Adjusts the opacity of the effect on your footage. At 100%, the effect is opaque. At 0%, the effect is transparent.
Blend Mode	The parameter allows you to choose from multiple blending modes.
Stereoscopic Side-by-Side	The Frame Layout parameter can be set to Stereoscopic Side-by-Side, in addition to the existing Monoscopic and Stereoscopic Over/Under options.
Horizontal and Vertical Field of View	The horizontal and vertical field of view can be independently set. By default, the values are 360x180. For VR 180 content, set both values to 180.

Apply VR Digital Glitch effect

Before

After

You can use the following parameters to play around with the effect on your footage:



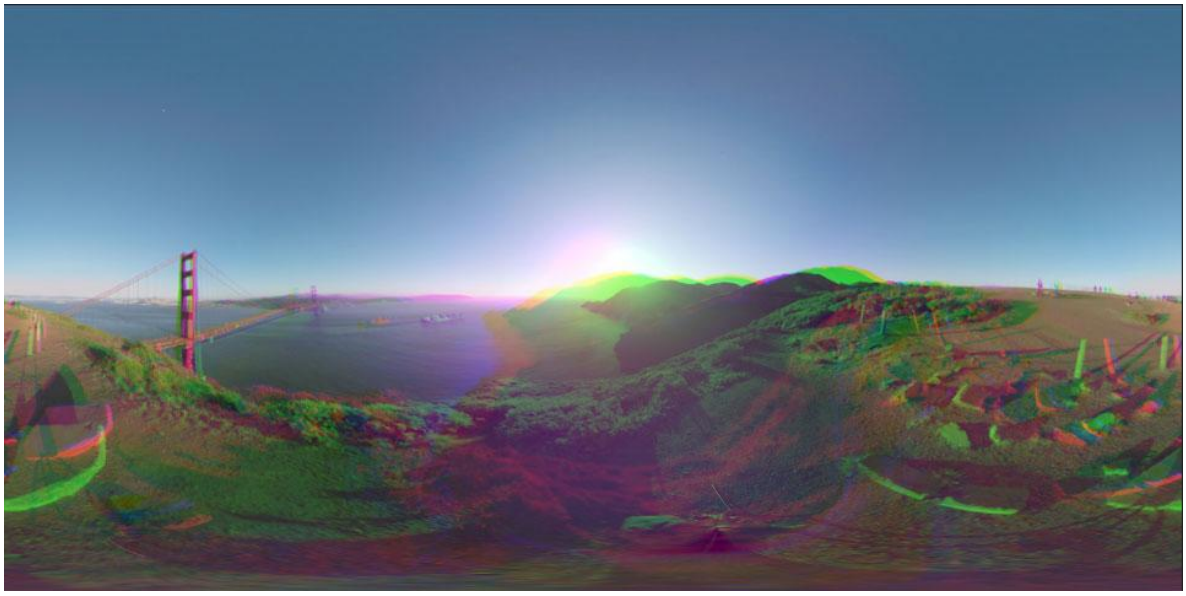
VR Digital Glitch settings

Parameter	Description
Frame Layout	Sets the frame layout as Monoscopic or Stereoscopic Over/Under.
Point of Interest	Adjusts the Point of Interest, which is the central location of the effect. You can keyframe the position for movement.
POI Scale (Point of Interest scale)	Adjusts the scaling for the effect from the point of interest. If you set the value as 100, the effect is applied to the entire footage. Scale down the value to apply the effect to only a part of the footage.
POI Aspect Ratio (Point of Interest aspect ratio)	Adjusts the aspect ratio of the Point of Interest Scale. If you set the effect to the minimum value of -100, the aspect ration becomes wide and short. The maximum value of 100 makes the ratio narrow.
Master Amplitude	Adjusts the overall threshold value of all the effect settings together. At 100, all the effect settings remain as set by you. At a value of 0, all the effect settings scale back to 0 from your settings.
Distortion	• Color Distortion: Adjusts the color distortion (RGB split) on your footage. • Geometry Distortion X: Adjusts the distortion on your footage in relation to the X-axis of your footage. Higher the value, more distortion on the axis. For best results, adjust the setting along with the Distortion Rate. • Geometry Distortion Y: Adjusts the distortion on your footage in relation to the Y-axis. Higher the value, more distortion on the axis. • Geometry Distortion Z: Adjusts the distortion on your footage in relation to the Z-axis. Higher the value, more distortion on the axis. • Distortion Complexity: Subdivides the areas of distortion on your footage. Higher the value, finer the distortion. Smaller the value, blocky the distortion. • Distortion Rate: Adjusts the distortion amount on your footage. Set the value as 100 to cover the entire video in distortion. Set the value as 0 for no distortion. • Distortion Evolution: Create a loop to animate the distortion created by Distortion Rate setting. Faster the cycle of animation, video displays faster glitching. Slower the cycle, video displays slower glitching. • Color Evolution: Animates the RGB color distortion created by the Color Distortion setting. Cycle the setting to achieve the effect.

Transform	• Scale X: Scales the distortion artifacts on the X-axis. • Scale Y: Scales the distortion artifacts on the Y-axis. • Scale Z: Scales the distortion artifacts on the Z-axis.Translate X: Adjust the movement of the distortion around your footage on the X-axis. • Translate Y: Adjusts the movement of the distortion around your footage on the Y-axis. • Translate Z: Adjusts the movement of the distortion around your footage on the Z-axis
Sub settings	• Sub Influence: Adjusts subdividing of visible distortion on your footage. • Sub Scaling: Adjusts subscaling of visible distortion on your footage.
Noise	• Noise Strength: Adjusts the opacity of noise visible on your footage. • Noise Quantity: Adjusts the density of the noise on your footage. • Noise Scale: Adjusts the scale of the noise on your footage. • Noise Evolution: Cycles the setting to animate the noise created by the Noise Strength setting. • Quantity settings: Adjusts the cycle speed of noise. Faster the cycles, faster is the distortion animation. • Color Noise: Enables colorized noise. • Random Speed: Random application of the Digital Glitch effect.
Stereoscopic Side-by-Side	The Frame Layout parameter can be set to Stereoscopic Side-by-Side, in addition to the existing Monoscopic and Stereoscopic Over/Under options.
Horizontal and Vertical Field of View	The horizontal and vertical field of view can be independently set. By default, the values are 360x180. For VR 180 content, set both values to 180.

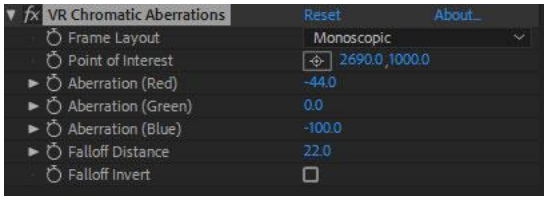
Apply VR Chromatic Aberration effect

Before



After

You can use the following parameters to play around with the effect on your footage:



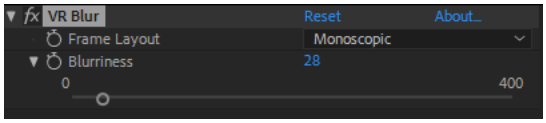
VR Chromatic Aberration settings

Parameter	Description
Frame Layout	Adjusts the frame layout - Monoscopic or Stereoscopic Over/Under.
Point of Interest	Adjusts the position of the point of interest of the footage. You can keyframe the point of interest position for movement.
Aberration (Red)	Adjusts the scale of the Red channel of your footage.
Aberration(Green)	Adjusts the scale of the Green channel of your footage.
Aberration (Blue)	Adjusts the scale of the Blue channel of your footage.
Falloff Distance	Adjusts the falloff distance of the effect from the point of interest. The higher the value, more clear aberrations.
Falloff Invert	Restricts occurrence of chromatic aberrations around the point of interest.
Stereoscopic Side-by-Side	The Frame Layout parameter can be set to Stereoscopic Side-by-Side, in addition to the existing Monoscopic and Stereoscopic Over/Under options.
Horizontal and Vertical Field of View	The horizontal and vertical field of view can be independently set. By default, the values are 360x180. For VR 180 content, set both values to 180.

Apply VR Blur effect

Before

After



VR Blur settings

VR Blur accurately blurs content while adjusting for the distortion in Equirectangular content.

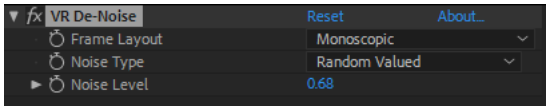
- **Blurriness**: You can adjust the convolution kernel radius.
- **Stereoscopic Side-by-Side**: The Frame Layout parameter can be set to Stereoscopic Side-by-Side, in addition to the existing Monoscopic and Stereoscopic Over/Under options.
- **Horizontal and Vertical Field of View**: The horizontal and vertical field of view can be independently set. By default, the values are 360x180. For VR 180 content, set both values to 180.

Apply VR De-Noise effect

Before

After

You can use the following parameters to play around with the effect on your footage:



VR De-Noise settings

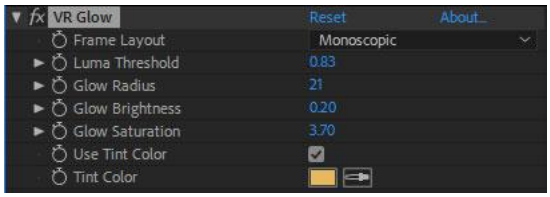
Parameters	Description
Noise Type	Choose a noise type - Random Valued or Slat-and-Pepper speckles.
Noise Level	Adjusts the input noise level.
Stereoscopic Side-by-Side	The Frame Layout parameter can be set to Stereoscopic Side-by-Side, in addition to the existing Monoscopic and Stereoscopic Over/Under options.
Horizontal and Vertical Field of View	The horizontal and vertical field of view can be independently set. By default, the values are 360x180. For VR 180 content, set both values to 180.

Apply VR Glow effect

Before

After

You can use the following parameters to play around with the effect on your footage:



VR Glow settings

Parameter	Description
Luma Threshold	Defines the areas in the image that glows. Areas where luma (brightness) is higher than threshold, between 0.0 (black) and 1.0 (white).
Glow Radius	Defines the radius of glowing halo.
Glow Brightness	Multiplies the glow brightness intensity.
Glow Saturation	Multiplies the glow saturation (color) intensity.
Use Tint Color	Blends tint color to the resultant glow color.
Tint Color	Chooses tint color.
Stereoscopic Side-by-Side	The Frame Layout parameter can be set to Stereoscopic Side-by-Side, in addition to the existing Monoscopic and Stereoscopic Over/Under options.
Horizontal and Vertical Field of View	The horizontal and vertical field of view can be independently set. By default, the values are 360x180. For VR 180 content, set both values to 180.

Apply VR Sharpen effect

The **VR Sharpen** effect adjusts the amount of sharpness in your footage.

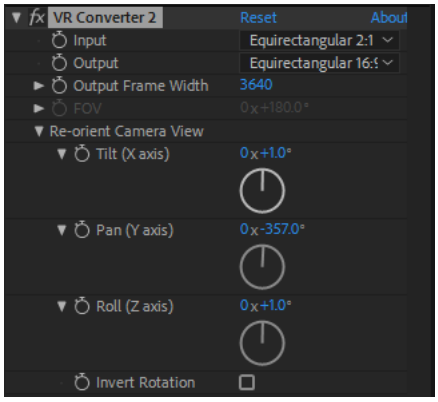
Parameter	Description
Sharpen Amount	You can adjust the relative sharpen amount from 0 to 100.
Stereoscopic Side-by-Side	The Frame Layout parameter can be set to Stereoscopic Side-by-Side, in addition to the existing Monoscopic and Stereoscopic Over/Under options.
Horizontal and Vertical Field of View	The horizontal and vertical field of view can be independently set. By default, the values are 360x180. For VR 180 content, set both values to 180.

Apply VR Converter effect

You can use VR Converter to convert your footage from 2D source, equirectangular, cubic, or spherical layouts to other VR layouts. You can also change the orientation of your footage and add logos, supers, or image patches.

The converter is divided into two functional categories:

- Input and Output formats
- Re-orient Camera View



VR Converter settings

VR Converter formats

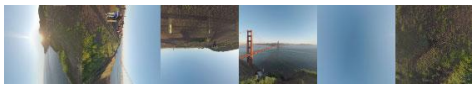
VR Converter can take inputs and provide outputs in the following formats:

VR Converter Input formats:

- Fisheye (FullDome)
- Cube-map Facebook 3:2
- Cube-map Pano2VR 3:2
- Cube-map GearVR 6:1
- Equirectangular 16:9
- 2D Source
- Cube-map 4:3

- Sphere-map
- Equirectangular 2:1

VR Converter Output formats:

Output formats	Example
Cube-map Pano2VR 3:2	
Cube-map GearVR 6:1	
Fisheye (FullDome)	

Equirectangular 16:9	
Cube-map Facebook 3:2	
Equirectangular 2:1	

Re-orient Camera View

You can change the camera orientation of your footage without restiching your camera views with the orientation tools in VR Converter:

- Tilt (X-Axis)
- Pan (Y Axis)
- Roll (Z Axis)

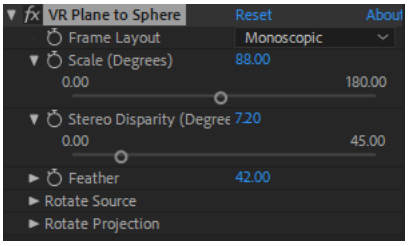
Adjust the value of the settings to achieve different results. You can keyframe the controls and achieve results such as camera tilts, pans, and rolls.

Apply VR Plane to Sphere effect

You can add text, logos, and graphics, and other 2D elements to your Monoscopic or Stereoscopic footage with the VR Plane to Sphere effect.

To work with the effect, use the following steps:

1. Import or create 2D element in your composition.
2. Select **Effects > Immersive Video**, and drag the effect to the timeline.
3. Adjust the effect parameters. The parameters include:

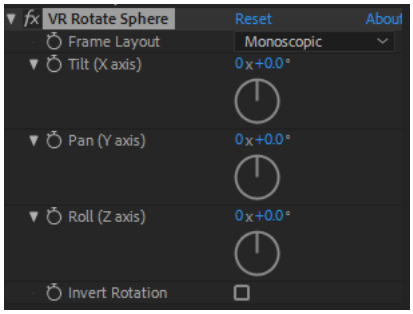


VR Plane to Sphere settings

- **Frame layout**: Select Monoscopic layout for non-stereo (non 3D) output. Select Stereoscopic for stereo 3D output.
- **Scale (Degrees)**: Adjusts the size of your 2D element.
- **Stereo Disparity (Degrees)**: Sets the distance between the left and right view to increase or decrease the amount of the 3D pop out effect. You can keyframe the parameter to allow for a change in stereo effect.
- **Feather**: Feathers the edges of the footage.
- **Rotate Source**: Adjusts the X, Y, or Z rotation of the 2D element relative to the anchor point. You can keyframe the parameter.
- **Rotate Projection**: Adjusts the X, Y, or Z rotation of the position of your element in the 360-degrees spherical environment.
- **Stereoscopic Side-by-Side**: The Frame Layout parameter can be set to Stereoscopic Side-by-Side, in addition to the existing Monoscopic and Stereoscopic Over/Under options.
- **Horizontal and Vertical Field of View**: The horizontal and vertical field of view can be independently set. By default, the values are 360x180. For VR 180 content, set both values to 180.

Apply VR Rotate Sphere effect

You can use the following parameters to play around with the effect on your footage:



VR Rotate Sphere settings

Parameter	Description
Frame Layout	Select Monoscopic layout for non-stereo (non 3D) output. Select Stereoscopic for stereo 3D output.
Invert Rotation	Adjusts the tilt, pan, and roll, and inverts them.

Tilt (X axis), Pan (Y axis), Roll (Z axis)	Readjusts the focal point and straightens the horizon, and adds camera movements to your footage.
Stereoscopic Side-by-Side	The Frame Layout parameter can be set to Stereoscopic Side-by-Side, in addition to the existing Monoscopic and Stereoscopic Over/Under options.
Horizontal and Vertical Field of View	The horizontal and vertical field of view can be independently set. By default, the values are 360x180. For VR 180 content, set both values to 180.

Animating with Puppet tools

Use the Legacy or Advanced Puppet tools to quickly add natural motion to raster images and vector graphics, including still images, shapes, and text characters.

Note:

Though the Puppet tools work within an effect (the Puppet effect), you don't apply the effect using the Effect menu or the Effects & Presets panel. Use the Puppet tools in the Tools panel to directly apply and work with the effect in the Layer panel or Composition panel.

Basics of Legacy Puppet tool

The Puppet effect works by deforming part of an image according to the positions of pins that you place and move. These pins define what parts of the image moves, what parts remain rigid, and what parts are be in front when parts overlap.

Each Puppet tool is used to place and modify a specific type of pin:

Puppet Pin tool

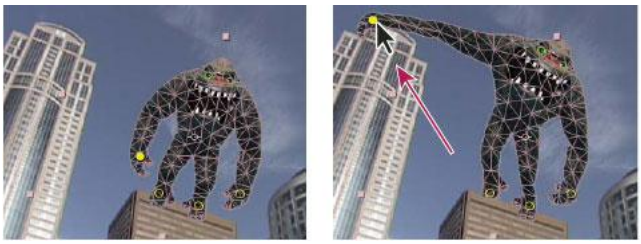
Use this tool to place and move Deform pins.

Puppet Overlap tool

Use this tool to place Overlap pins, which indicate which parts of an image should appear in front of others when distortion causes parts of the image to overlap one another.

Puppet Starch tool

Use this tool to place Starch pins, which stiffen parts of the image so that they are distorted less.



Mesh created by placing Deform pins (left), and result of dragging a Deform pin

When you place the first pin, the area within an outline is automatically divided into a mesh of triangles. An outline is only visible when the Puppet effect has been applied and a Puppet tool pointer is over the area that the outline defines. (See How the Puppet effect creates outlines.) Each part of the mesh is also associated with the pixels of the image, so the pixels move with the mesh.

Note:

To show the mesh, select Show in the Tools panel.

When you move one or more Deform pins, the mesh changes shape to accommodate this movement, while keeping the overall mesh as rigid as possible. The result is that a movement in one part of the image causes natural, life-like movement in other parts of the image.

For example, if you place Deform pins in a person's feet and hands and then move one of the hands to make it wave, the motion in the attached arm is large, but the motion in the waist is small, just as in the real world.

If a single animated Deform pin is selected, its Position keyframes are visible in the Composition panel and Layer panel as a motion path. You can work with these motion paths as you work with other motion paths, including setting keyframes to rove across time. (See Create smooth motion with roving keyframes.)

You can have multiple meshes on one layer. Having multiple meshes on one layer is useful for deforming several parts of an image individually—such as text characters—as well as for deforming multiple instances of the same part of an image, each with a different deformation.

The original, undistorted mesh is calculated at the current frame at the time at which you apply the effect. The mesh does not change to accommodate motion in a layer based on motion footage, nor does the mesh update if you replace a layer's source footage item.

Note:

Don't animate the position or scale of a continuously rasterized layer with layer transformations if you are also animating the layer with the Puppet tools. The render order for continuously rasterized layers—such as shape layers and text layers—is different from the render order for raster layers. You can precompose the shape layer and use the Puppet tools on the precomposition layer, or you can use the Puppet tools to transform the shapes within the layer. (See Render order and collapsing transformations and Continuously rasterize a layer containing vector graphics.)

The motion created by the Puppet tools is sampled by motion blur if motion blur is enabled for the layer and the composition, though the number of samples used is half of the value specified by the Samples Per Frame value. (See Motion blur.)

You can use expressions to link the positions of Deform pins to motion tracking data, audio amplitude keyframes, or any other properties.

Online resources for the Puppet tools

Aharon Rabinowitz provides a tutorial on the Creative COW website that shows a creative way to use the Puppet tools with a particle generator to simulate airflow over a car.

Robert Powers provides a video tutorial on the Slippery Rock NYC website that demonstrates the use of parenting and the Puppet tools to animate a character.

Dave Scotland provides a video tutorial on the CG Swot website that demonstrates how to create a looping character animation using the Puppet tools.

Daniel Gies provides a detailed series of video tutorials in which he demonstrates the use of inverse kinematics and the Puppet tools to rig and animate a character.

Manually animate an image with the Puppet tools

The stopwatch switch is automatically set for the Position property of a Deform pin as soon as the pin is created. Therefore, a keyframe is set or modified each time that you change the position of a Deform pin. This auto-keyframing is unlike most properties in After Effects, for which you must explicitly set the stopwatch switch by adding a keyframe or an expression to animate each property. The auto-animation of Deform pins makes it convenient to add them and animate them in the Composition panel or Layer panel, without manipulating the properties in the Timeline panel.

1. Select the layer that contains the image to animate.
2. Using the Puppet Pin tool , do one of the following in the Composition panel or the Layer panel:
   - Click any nontransparent pixel of a raster layer to apply the Puppet effect and create a mesh for the outline created by auto-tracing the alpha channel of a layer.
   - Click within a closed path on a vector layer to apply the Puppet effect and create a mesh for the outline defined by that path.
   - Click within a closed, unlocked mask to apply the Puppet effect and create a mesh for the outline defined by the mask path.
   - Click outside all closed paths on a vector layer to apply the Puppet effect without creating a mesh. Outlines are created for paths on the layer, though an outline is only visible when a Puppet tool pointer is over the area that the outline defines. Place the pointer over the area enclosed by a path to see the outline in which a mesh will be created if you click that point. (See How the Puppet effect creates outlines.) Click within an outline to create a mesh.

   A Deform pin is placed where you clicked to create the mesh.

   Note:

   If an image is too complex for the Puppet effect to generate a mesh with the current Triangle value, a "Mesh Generation Failed" message appears in the Info panel. Increase the Triangle value in the Tools panel and try again.
3. Click in one or more places within the outline to add more Deform pins.

   Use as few pins as possible to achieve your desired result. The natural deformation provided by the Puppet effect can be lost if you over-constrain the image. Just add pins to the parts of the figure that you know that you want to control. For example, when animating a person waving, add a pin to each foot to hold them to the ground, and add a pin to the waving hand.
4. Go to another time in the composition, and move the position of one or more of the Deform pins by dragging them in the Composition or Layer panel with the Puppet Pin tool. Repeat this step until you have completed your animation.

You can modify the motion paths of the Deform pins using the same techniques that you use to modify any other motion paths.

Note:

After Effects no longer draws the tinted fill for the original layer region when hovering using the Puppet Pin tool.

Record animation by sketching motion with the Puppet Pin tool

You can sketch the motion path of one or more Deform pins in real time—or at a speed that you specify—much as you can sketch the motion path of a layer using Motion Sketch.

If your composition contains audio, you can sketch motion in time with the audio.

Before you begin recording motion, you may want to configure settings for recording. To open the Puppet Record Options dialog box, click Record Options in the Tools panel.

Speed The ratio of the speed of the recorded motion to speed of playback. If Speed is 100%, the motion is played back at the speed at which it was recorded. If Speed is greater than 100%, the motion plays back slower than it was recorded.

Smoothing Set this value higher to remove more extraneous keyframes from the motion path as it's drawn. Creating fewer keyframes makes motion smoother.

Use Draft Deformation The distorted outline that is shown during recording does not take Starch pins into account. This option can improve performance for a complex mesh.

Note:

This procedure assumes that you have already placed Deform pins in the object to animate. For information on placing Deform pins, see Manually animate an image with the Puppet tools.

1. Select one or more Deform pins.
2. Go to the time at which to begin recording motion.
3. In the Composition panel or Layer panel, hold the Ctrl (Windows) or Command (Mac OS) key to activate the Puppet Sketch tool. Ctrl-drag (Windows) or Command-drag (Mac OS) the pins to animate.

   Recording of motion begins when you click to begin the drag. Recording ends when you release the mouse button.

   The color of the outline for the mesh for which motion is being sketched is the same as the color of the pin (yellow). Reference outlines, for other meshes on the same layer, match the label color of the layer.

   The current-time indicator returns to the time at which recording began, so that you can repeat the recording operation with more Deform pins or redo the recording operation with the same pins.

You can modify the motion paths of the Deform pins using the same techniques that you use to modify any other motion paths. The motion path for a pin is shown only if it is the only pin selected.

Try creating several duplicate meshes and sketching motion for each mesh. When you have multiple meshes in the same instance of the Puppet effect, you can sketch motion for one mesh while seeing the reference outlines of the others, allowing you to follow their movements, either roughly or precisely.

How the Puppet effect creates outlines

When a Puppet mesh is created, its boundaries are determined by an outline, which can be defined by any of the following types of closed paths:

- An unlocked mask path
- A shape path on a shape layer
- A text character's outline

If a layer has no unlocked masks, shapes, or text characters on it when you apply the Puppet effect, it uses Auto-trace to create paths from the alpha channel. These paths are only used by the Puppet effect in the determination of outlines and do not appear as masks on the layer. If the layer is a raster layer with no alpha channel, the result is a single rectangular path around the bounds of the layer. For a complex image, or to configure Auto-trace settings, use Auto-trace before using the Puppet tools. (See Create a mask from channel values with Auto-trace.)

A text character that consists of multiple disjoint closed paths (such as the letter *i*) is treated as multiple separate paths.

The stroke of a shape or text character is not used in the determination of outlines; only the path is used. To encompass a stroke within a mesh created from such items, increase the Expansion value. The default value of 3 pixels for Expansion encompasses a stroke that extends 3 pixels or less from its path.

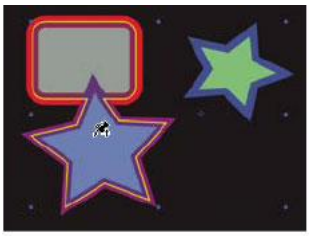
Apply paint strokes to a layer using the Brush tool with the Paint On Transparent option. Painting with this option selected creates a raster layer with only the paint strokes, defined by an alpha channel. You can then use the Puppet tools to animate the paint strokes. Do not use a mask on the layer.

If multiple masks, shapes, or characters overlap on the same layer, an outline is created from the union of the overlapping shapes, overlapping characters, or overlapping masks. If a mask overlaps a text character or shape, outlines are created for the entire character or shape, for the portion of the character or shape that is inside the mask, and for the mask itself.

To distort multiple disjoint characters or shapes as one object, surround the individual objects with a mask (with mask mode set to None), and use the mask path as the outline with which to create the mesh. You can delete the mask after you have created the mesh.

If the Puppet effect has already been applied to a layer, outlines appear with a yellow highlight as you move a Puppet tool pointer over them. You can choose the outline in which to place an initial pin to create a mesh. A mesh is created each time that you click within an outline with a Puppet tool.

If the Puppet effect has not already been applied to a layer, outlines for that layer have not yet been calculated. When you click, the Puppet effect calculates outlines and determines whether you have clicked within an outline. If so, it creates a mesh defined by the outline in which you clicked. Otherwise, you can move the pointer around in the layer to select the outline in which to place a pin and create a mesh. Moving the pointer around in the layer is useful for seeing the outlines of various objects and choosing which outlines to use to create a mesh.



Outline for union of two shape paths, indicated by yellow highlight, visible because Puppet tool pointer is within area defined by outline

Work with Puppet pins and the distortion mesh

- To show the mesh for the Puppet effect, select Show in the options section of the Tools panel.
- To select or move a pin, click or drag it with the Move tool. To activate the Move tool, place the pointer on a pin while either the Selection tool or the corresponding Puppet tool is active.
- To select multiple pins, Shift-click them, or use the marquee-selection tool to drag a marquee-selection box around them. To activate the marquee-selection tool, place the pointer for a Puppet tool outside all meshes and outlines or hold the Alt (Windows) or Option (Mac OS) key.

- To select all pins of one kind (Deform, Starch, or Overlap), select one pin of that kind and press Ctrl+A (Windows) or Command+A (Mac OS).
- To delete selected pins, press the Delete key. If the pin has multiple keyframes, and only the keyframe at the current time is selected, pressing Delete deletes only that keyframe; pressing Delete again deletes the pin.
- To reset Deform pins to their original locations at the current time, click Reset for the Puppet effect in the Timeline panel or Effect Controls panel. To remove all pins and meshes from an instance of the Puppet effect, click Reset again.

Sometimes, you want to animate an image from an initial position, through an intermediate position, and back to the initial position. Rather than manually dragging the pins back to their initial positions at the end of the animation, place the current-time indicator at the end time and click Reset. Only the keyframes at the current time are reset.

- To increase or decrease the number of triangles used in a mesh, modify the Triangle value in the options section of the Tools panel or in the Timeline panel. Modifying the Triangle value sets the value for a selected mesh or, if no mesh is selected, sets the value for meshes created later.

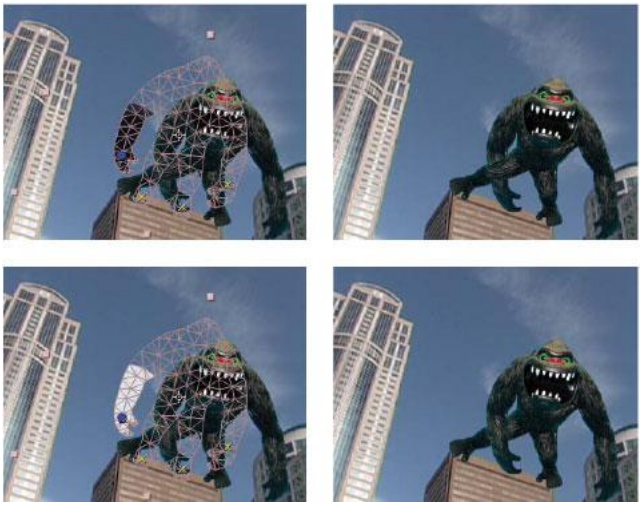
A higher number of triangles gives smoother results but takes longer to render. Small objects, like text characters, usually distort well with only 50 triangles, whereas a large figure may require 500. The number of triangles used may not match the Triangle value exactly; this value is a target only.

- To expand the mesh beyond the original outline, increase the Expansion property in the options section of the Tools panel or in the Timeline panel. Modifying the Expansion property sets the value for a selected mesh or, if no mesh is selected, sets the value for meshes created later. Expanding the mesh is useful for encompassing a stroke.
- To duplicate an object using Puppet Pin tool, click within the original outline. Clicking within the original outline creates a new mesh, with its own copy of the pixels from within the original outline. You can also duplicate a Mesh group in the Timeline panel to achieve the same result, which is sometimes easier than clicking within the original outline without clicking the mesh to create a pin.

Puppet Overlap controls

When you are distorting one part of an image, you may want to control which parts of the image appear in front of other parts. For example, you may want to keep an arm in front of the face as you make the arm wave. Use the Puppet Overlap tool to apply Overlap pins to the parts of an object for which you want to control apparent depth.

You apply Puppet Overlap pins to the original outline, not to the deformed image.



Overlap pin with negative In Front value (top), and Overlap pin with positive In Front value (bottom)

Each Overlap pin has the following properties:

In Front The apparent proximity to the viewer. The influence of Overlap pins is cumulative, meaning that the In Front values are added together for places on the mesh where extents overlap. You can use negative In Front values to cancel out the influence of another Overlap pin at a specific location.

An area of the mesh that is not influenced by Overlap pins has an implicit In Front value of 0. The default value for a new Overlap pin is 50.

When animating the In Front value, you should usually use Hold keyframes. You do not usually want to interpolate gradually from an element being in front to an element being in back.

Extent How far from the Overlap pin its influence extends. The influence ends abruptly; it does not decrease gradually with distance from the pin. Extent is indicated visually by a fill in the affected parts of the mesh. The fill is dark if In Front is negative; the fill is light if In Front is positive.

Puppet Starch controls

When you are distorting one part of an image, you may want to prevent other parts from being distorted. For example, you may want to preserve the rigidity of an arm as you move a hand to make it wave. Use the Puppet Starch tool to apply Starch pins to the part of an object that you want to keep rigid.

You apply Puppet Starch pins to the original outline, not to the deformed image.

Unwanted distortion in figure (upper left) is prevented with Starch pin (upper right and lower left)

Each Starch pin has the following properties:

Amount The strength of the stiffening agent. The influence of Starch pins is cumulative, meaning that the Amount values are added together for places on the mesh where extents overlap. You can use negative Amount values to cancel out the influence of another Starch pin at a specific location.

If you notice image tearing near a Deform pin, use a Starch pin with a very small Amount value (less than 0.1) near the Deform pin. Small Amount values are good for maintaining image integrity without introducing much rigidity.

Extent How far from the Starch pin its influence extends. The influence ends abruptly; it does not decrease gradually with distance from the pin. Extent is indicated visually by a pale fill in the affected parts of the mesh.

In addition to animating still images, you can use the Puppet effect on a layer with motion footage as its source. For example, you could distort the contents of the entire composition frame to match the motion of an object within the frame. In this case, consider creating a mesh for the entire layer, using the layer boundaries as the outline, and using the Puppet Starch tool around the edges to prevent the edges of the layer from distorting.

Basics of Advanced Puppet Tool

The Puppet tools and Puppet effect in After Effects use an enhanced puppet engine called the Advanced Puppet Tool, and the old engine is called the Legacy puppet engine. In After Effects 15.1 and later, the Advanced puppet engine is the default engine for your projects. Projects saved in earlier versions of After Effects use the legacy Puppet engine by default. To access the Advanced Puppet Tools, click the **Pin** icon in the **Toolbar** and the **Puppet** group is displayed in the **Timeline** panel.

At the core, the advanced puppet engine use similar concept as the legacy puppet engine, the differences being:

- New pin behaviors and pin types
- Smoother and customizable deformations
- Enhanced density

Difference between Legacy puppet engine and Advanced puppet engine

Legacy Puppet Tool vs Advanced Puppet Tool

Refer to the table below to understand the key differences between the **Legacy** and **Advanced** puppet engines:

Legacy puppet engine	**Advanced puppet engine**
Triangle control: Specifies the highest number of triangles allowed for a mesh. Legacy Puppet Tool uses smart triangle placement in the mesh with a higher density of triangles to achieve better results.	**Density** control replaces the **Triangle** control. Density controls the layout, size, and amount of triangles automatically calculated within a mesh. With higher density, the maximum and minimum triangle sizes reduce, you can add more triangles between pins, and the maximum number of triangles allowed have increased. Lower the density, the triangle size increases and creates a sparse mesh.
Starch pins are under the **Stiffness** group.	**Starch** pin are under the **Deform** group and the **Stiffness** group is discontinued.
Starch pins have Extent control to manipulate the extent to which the pin impacts the puppet.	**Starch** pins do not have **Extent** control, but can impact the stiffness in the region between **Starch** pins and other pins. The **Advanced** puppet engine interprets the Starch pins as Position pins.
You can't convert **Starch** pins into any other form of pins.	You can convert **Starch** pins into **Position** pins with the **Pin Type** property.
No option of **Mesh Rotation Refinement**.	**Mesh Rotation Refinement**, specifies the maximum amount any position or starch pin rotates to minimize deformation. Higher the value, higher is the amount of rotation (flexible deformation), and lower the value, lower is the amount of rotation (stiff deformation).

Improvements to Advanced Puppet Tool

You can use the **Puppet Engine** control to choose between the **Advanced** puppet engine and the **Legacy** puppet engine. To choose, in the **Timeline** panel, click the drop-down menu next to **Puppet engine**, and select the engine. You can switch between the two engines but After Effects recommends that you avoid switching after you place or animate pins for the following reasons:

- As the two engines interpret pins differently, switching could change the deformation.
- Starch pins are different in Advanced puppet engine and so the Legacy puppet engine treats advanced starch pins, as normal position pins, and the Advanced puppet engine ignores legacy starch pins.

Types of pins in the Advanced Puppet Tool

The Advanced Puppet Tool offers the following types of pins to animate your puppets. To apply these pins, select the pin type in the Puppet Tool menu in the toolbar.

- **Puppet Position Pin Tool**: The pins you place with this tool can only control the position of the pin. These pins display as yellow circles in the UI.
- **Puppet Starch Pin Tool**: These pins display as red circles in the UI.
- **Puppet Overlap Pin Tool**: These pins display as blue circles in the UI.
- **Advanced Pins**: Enables you to control the position, scale, and rotation of the pin. This allows significant control over how the Puppet effect mesh deforms around that pin. The mesh can create noticeable shearing if you do not animate all three properties. For example, you can use an advanced pin to animate the head of a character to move to the side and look downwards. However, if you do not animate the rotation manually, the head continues to point in the same direction and create a stretched appearance. These pins display as blue-green circles in the UI.
- **Bend Pins**: These pins automatically calculate their location from the surrounding pins, similar to starch pins, while allowing you to control of the scale and rotation of the pin. You can use the bend pins to create the appearance of the chest of the character breathing, or of a wagging tail. Another case can be where you scale or rotate a part of the mesh but have the position of the pin automatically move with the rest of the puppet. These pins display as orange-brown circles in the UI.

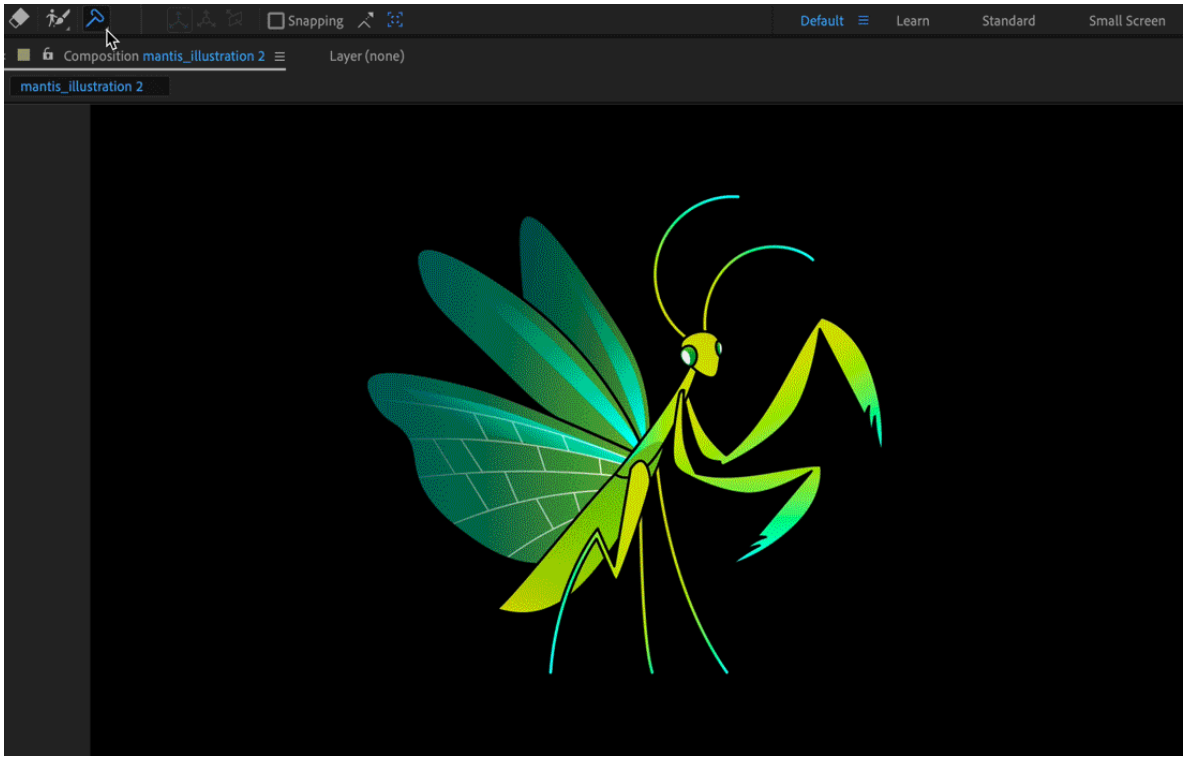
Work with advanced pins and bend pins

The advanced pins and bend pins have controls to adjust scale and rotation:

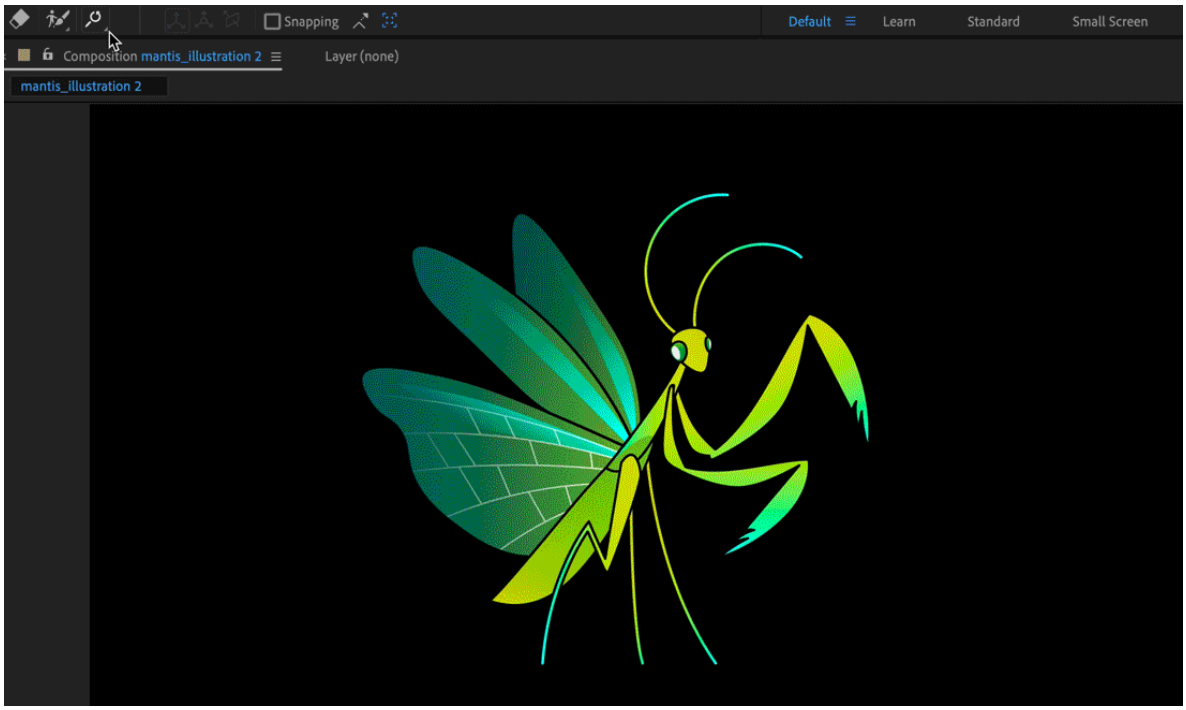
When you select bend pins or advanced pins in the **Puppet Tool** panel, it displays a rotation and scale control - larger, outer circle with a single square handle.

Use the following steps to change the rotation and scale controls:

1. To change rotation, click anywhere on the outer circle and drag around the circle.
2. Hold the *Shift* key while you drag to constrain rotation to 15 degree increments.
3. To change scale, click the square handle and drag in or out from the outer circle.
4. Hold the **Shift** key while you drag to constrain scale to 5% increments.



Work with Advanced Puppet pin



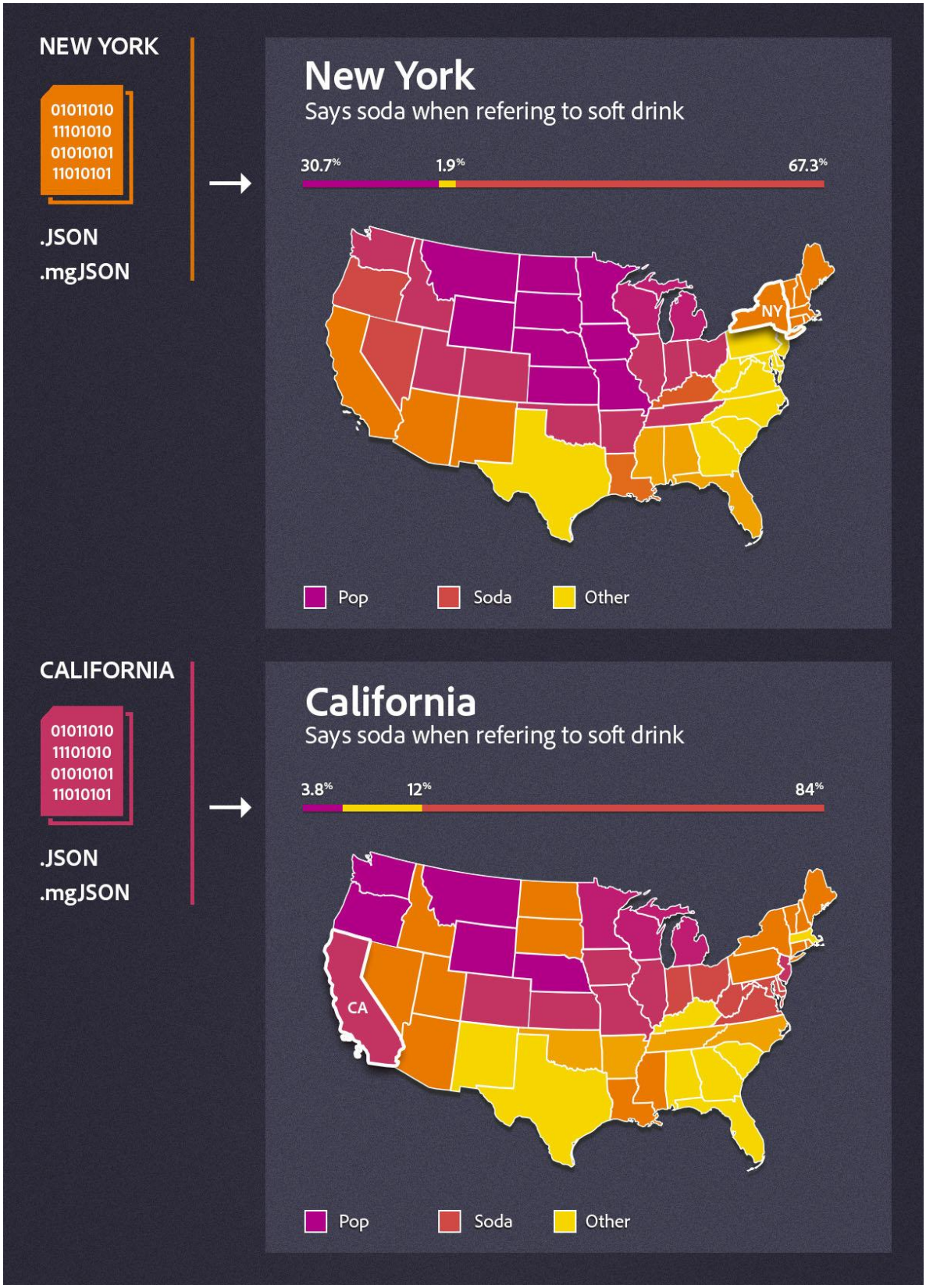
Work with Bend Puppet pin

Other enhancements to Advanced Puppet Tool

- You can switch the existing pin types between **Position** and **Starch**.
- The Puppet **Starch** tool has a different icon, and is second in the list of Puppet tools in the **Toolbar** panel.
- **Path Point** and **Handle Size** options in **Preferences > General** affect pin size. Also when you hover the mouse over the pins, they increase in size.
- The Puppet effect ignores masks set to **None**, or any mask used by an effect as a mask reference (**effect properties > Compositing Options > Mask Reference**), when calculating the mesh outline.

Work with Data-driven animation

Data-driven animations are created using live data collected from various data sources that drive animations in your composition. You can use data from multiple data sources. The data can be static or time-varying. You can import the data into your After Effects project and use it as input that can animate graphs, characters, control visual effects and movie titles, and other motion graphics.


NEW YORK
01011010
11101010
01010101
11010101
.JSON
.mgJSON
New York
Says soda when refering to soft drink
30.7%
1.9%
67.3%
NY
Pop
Soda
Other
CALIFORNIA
01011010
11101010
01010101
11010101
.JSON
.mgJSON
California
Says soda when refering to soft drink
3.8%
12%
84%
CA
Pop
Soda
Other

Data-driven animation example

Data Sources

You can use data from almost every possible source such as:

- **Device Generated Data Files** – Data from devices such as fitness trackers that record activity through sensors and store them in different file formats. This time-varying data includes - speed, altitude, distance, heart rate, and various other parameters of user activity.
- **User Generated Static Data** – Global static data such as survey results that can be changed to drive graphics. A user created data file could provide a workflow for global data.
- **URL** – Live data from websites such as entry and exit path of a user navigating through a web page.
- **Metadata** - Data embedded in Video File Metadata.

Input Formats

You can import data files in the following formats:

- JSON
- MGJSON
- CSV
- TSV
- BVH

If you have data files in other formats, convert them to any of the supported import file formats and import into After Effects project. There are various conversion tools available to convert data files into After-Effects-supported formats.

Data-driven animation

Data-driven animation

Support for standard JSON (.json)

You can import a standard JSON file into After Effects as footage and the data files work in the background. After Effects directly references the data in these data files to drive animations within projects. JSON footage is not represented as data streams in the **Timeline** panel. You can reference the data using expressions as an evaluated JSON object.

You can modify the expressions to change how data is referenced. You can write the data in a text editor, referenced by After Effects to drive animations. JSON support is based on the JSON schema, which specifies and defines how an application uses and modifies JSON data.

JSON's basic data types are:

- **Number**: A signed decimal number.
- **String**: A sequence of zero or more Unicode characters.
- **Boolean**: Either of the values true or false.
- **Array**: An ordered list of zero or more values.
- **Object**: an unordered collection of name or value pairs where the names (keys) are strings.

- **Null**: An empty value, using the word 'null'.

Work with JSON file in After Effects

To work with a standard JSON file, use the following steps:

1. Select **File** > **Import**.
2. To import, select a .JSON file and click **Open.**
3. The file is added to your project window. Create a composition with the footage.
4. Add a solid to the composition. To add a solid, select **Layer** > **Solid.**
5. In the **Timeline** panel, twirl open the properties of the solid layer and Alt+Click the **Opacity** parameter.
6. Change the data in the expression to modify your animation. You can control the JSON data and the data is referenced from the data file where all the information is stored.
7. You can also replace the JSON file with another JSON file to change the data being referenced. To replace, select **Replace Footage** > **File**, and open the new file from your computer.

To use the data, you can apply an expression on the property you wish the data to drive, then:

1. Use the sourceData attribute to read the data in a .JSON file. For example:

   ```
   var sampleData = footage("sample.json").sourceData;
   ```

2. To return its value, reference the specific property inside the JSON data. For example,

   ```
   myData.engineData.RPM or myData.latitude.value.
   ```

Support for Motion Graphics JSON (.mgJSON)

You can import a MGJSON data file as footage in your project. When you add data footage to a composition, data property streams are grouped into a top-level group "Data". The Data group displays footage data as Properties. Each property in the data group is expression linked back to the footage file that access the data file value using the expression *footage("foo.mgjson").dataValue(N)*. Here **N** is the path to the data stream in the file. MGJSON works based on a schema, which is designed to simplify referencing and importing data streams in After Effects.

Each individual data property has an expression applied which links that property to the data in the MGJSON file. If the source MGJSON file is changed, the data property values are automatically updated.

In the **Timeline** panel, you can twirl open the Data layers and use the pick-whip to link parameters to other parameters. The changes are automatically populated.

Work with MGJSON footage in After Effects

To work with an MGJSON file, use the following steps:

1. Select **File** >**Import**.
2. To import, select an MGJSON file and click **Open**.
3. The file is added to your project window. Create a composition with the footage.
4. Import an asset into the project and add it to the composition.
5. In the **Timeline** panel, twirl open the properties of the footage.
6. **Pick whip** one of the properties of the asset, for example – **Rotation** to one of the data streams in the data layer. The asset property is now referencing the data from the data layer. Each reflected data stream has an expression that pulls its value from the footage file.

7 When you preview the footage, the asset animates based on the data stream of the data layer.

You can also convert the data samples from the data file into keyframes. To convert into keyframes, follow these steps:

1 Import MGJSON file into your project and drag into **Timeline** panel.

2 Right-click the data layer and select **Keyframes Assistant** > Create Keyframes from Data from the **Layer and Keyframe Assistant** menu.

3 To view the keyframes, twirl open the data layer.

Note:

After keyframe conversion, the data is no longer live and is not referenced from the data file.

You can also view live data as a graph in the **Graph Editor**. To view, click the **Graph Editor** icon in the **Timeline** panel.

Data-driven animation uses expression reference. For more information, see Data-driven animation (expression reference).

Align video in time to mgJSON data

The **Layer > Time > Align Video to Data** command offsets video layers by various frames, as specified in an mgJSON file. You can use this command to align video in time to data samples stored in a matching mgJSON file. For example, if you captured data during a race, but the start time of the video does not match the start time of the captured data, you can specify the offset so that the data is automatically aligned.

To align video in time to mgJSON data, use the following steps:

Add the .mgJSON file to a composition that also contains the target layers.

Select both the .mgJSON layer and the target layers.

Select **Layer > Time > Align Video to Data**.

For this to work, the mgJSON file must contain a **videoSyncTimeList** group that contains:

- The name of one or more target layers (fileName)
- The number of frames to offset (frameNumber) those layers from the start of the data layer.

For example:

"videoSyncTimeList": [{ "fileName": "sample1.mp4", "frameNumber": 1000 },

{ "fileName": "sample2.mp4", "frameNumber": -1000 }

A fileName value must be the layer name of a selected layer, not the the source name of the layer. If you change the name of a layer with a source in your composition, for example - rename the layer "sample1.mp4" to "Race Camera 1", you also need to change the fileName value in the mgJSON file to match. Layers referenced by fileName do not have to be footage items with a source file, they can also be solids, nested compositions, or other layer types.

Positive frameNumber values offset the target layer to the left (before the data layer). Negative frameNumber values offset the target layer to the right (after the data layer). A frameNumber value of 0 aligns the start of the target layer to the start of the data layer.

Support for CSV (.csv) and TSV (.tsv or .txt)

You can import Comma-separated value (.csv) and Tab-separated value (.tsv or .txt) files as footage into After Effects and use them as data sources. CSV and TSV files store tabular data in plain text format with values separated either by comma characters or tab characters. The CSV and TSV data files work similar to how the JSON files work.

To use CSV or TSV data files in After Effects, follow these steps:

Import a CSV or TSV file into your project as footage, similar to how you import a video, audio, or other files.Use any of the following ways to import your files as footage:

- Select **File** > **Import**.
- Right-click the **Projects** panel and select **Import** > **File type**.
- Double-click the **Projects** panel.

1 The file is added to your project window. Create a composition with the file.

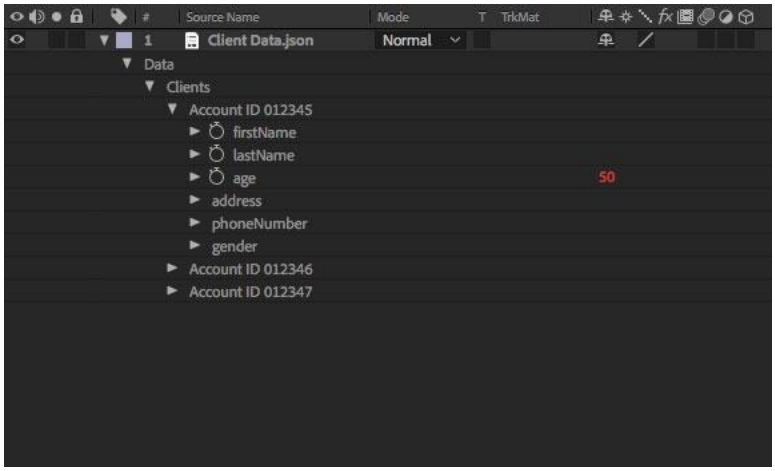
2 In the **Timeline** panel, twirl open the properties of the footage. Link the data properties of the layer in the composition to another layer with the expression pick whip or the Property Link pick whip. To open the expressions text field, hold *Shift* and click the timer icon against the name of the layer. You can also link the data properties through the **Edit** > **Copy With Property Links** command .

   To learn about layer data properties in the Timeline, see Basics of Data properties.

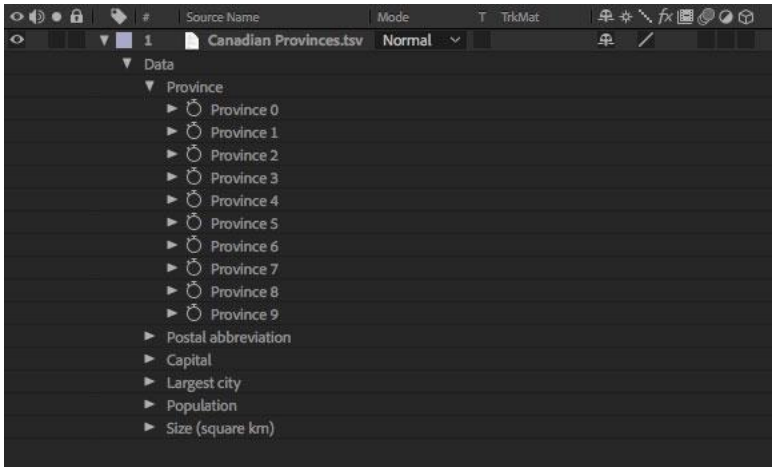
3 To reference the data footage file, use an expression on the property that you want the data to drive. Use the *dataValue()* footage attribute to read the data from a specified row and column. Rows and columns are zero-indexed. For example, *footage("sample.tsv").dataValue([15,1])*returns the value on row 16 of the second column.

Basics of Data properties

When you add a JSON, CSV, or TSV file to a composition and open their properties, they contain only a **Data** properties group, instead of the **Transform** properties group. The Data properties group contains the hierarchy of data as defined in the file.



JSON Data properties group in the Timeline panel



CSV and TSV Data properties group in the Timeline panel

This data group is similar to how After Effects treats Motion Graphics JSON (.mgJSON) files. The difference is that JSON, CSV, and TSV can only contain static data values, while mgJSON can contain dynamic data (data that changes over time).

Each individual data property has an expression applied which links that property to the data in the JSON, CSV, or TSV file. If you change the source data file, the data property values reflect the change.

Link properties with the Property Link pick whip

If you do not wish to write complex expressions, you can use the **Property Link** pick whip or the **Edit > Copy with Property Links** command to link th data properties to properties of other layers. As you link the layers, the **Property Link** pick whip automatically writes expressions for you.

Custom expression function libraries - JSX

In After Effects 15.0, it was possible to import a JSON file that defined custom JavaScript functions, which you could use as a library of custom expression functions. In After Effects 15.1, JavaScrpt objects are not legal syntax for JSON. After Effects 15.1 uses a different JSON parser that is strict and does not allow import of a JSON file with illegal syntax.

If you try to import a JSON file with a defined JavaScript function in After Effects 15.1, or open a project that contains such a file, After Effects displays an error.

To avoid the issue, you can import a JavaScript syntax extension file (.jsx) into After Effects 15.1. The content of the JSX file can be the same as a JSON file imported into After Effects 15.0, you only need to change the filename extension to .jsx. If you open an existing project that contains a JSON file that does not work, use **File > Replace Footage** to replace the JSON file with the JSX file. The expression references to the JSON file are replaced by references to the JSX file.

Known issues with Data-driven animation

While you work with Data-driven animations in After Effects, you can run into a few issues. For a complete list, see known issues with Data-driven animations.

Compositing tools for VR 360 and VR 180 videos

Overview

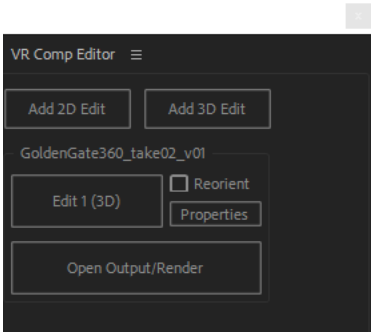
Use the VR Comp Editor to work with your 360/180-degree footage as regular footage in After Effects. The editor provides you view-based editing to view the footage as you would see through a VR headset. The compositing tools in the VR Comp Editor use 2D and 3D edits to build a spherical composite. Use the editor to switch between edits in your spherical composite and view the final output.

Work with VR Comp Editor

To work with VR Comp Editor, use the following steps:

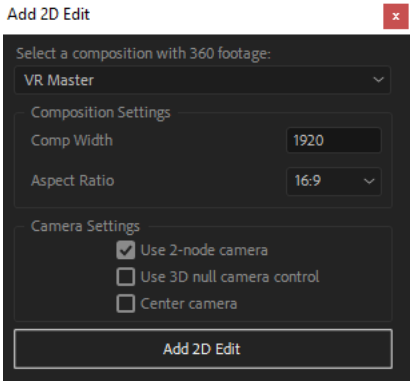
1 To launch the **VR Comp Editor**, select **Windows > VR Comp Editor.jsx**.

2 In the **VR Comp Editor** dialog, choose between **Add 2D Edit** and **Add 3D Edit** to open the respective dialogs.

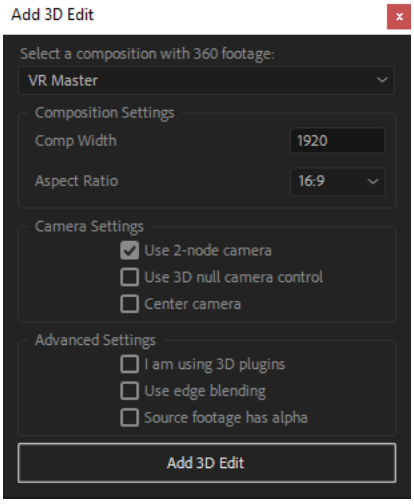


VR Comp Editor options

3 Adjust the **Comp Width** and **Aspect Ratio**. The settings do not affect the size and aspect ratio of your composition window. Click **Add 3D Edit** or **Add 2D Edit** when done. 2D edits place composites inside the sphere. 3D edits are rendered from multiple camera directions and then stitched over the spherical background.

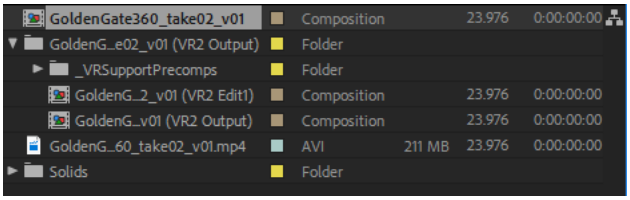


Add 2D Edit settings



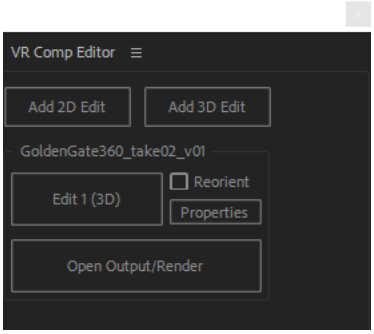
Add 3D Edit settings

4 After Effects creates two composition timelines in the **Project** panel - **Edit1** composition and **Output** composition. The **Edit 1** composition displays a non-warped, 16:9 footage, and **Output** composition displays an equirectangular view of your footage.


GoldenGate360_take02_v01 Composition 23.976 0:00:00:00
GoldenG..e02_v01 (VR2 Output) Folder
_VRSupportPrecomps Folder
GoldenG..2_v01 (VR2 Edit1) Composition 23.976 0:00:00:00
GoldenG..v01 (VR2 Output) Composition 23.976 0:00:00:00
GoldenG..60_take02_v01.mp4 AVI 211 MB 23.976 0:00:00:00
Solids Folder

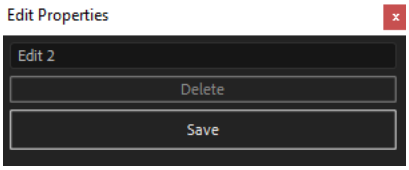
Edit1 and Output composition in Project panel

5 In the **VR Comp Editor** dialog, click **Edit 1** to activate the Edit 1 composition. After Effects allows you to work in the **Edit 1** composition window. You can add elements such as Immersive video effects, masks, shapes, and external graphics to your composition. Click **Open Output/Render** to view the results.

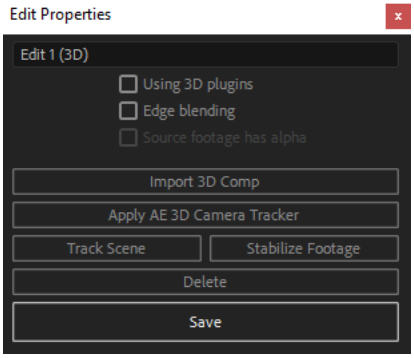


Current composition settings

6 You can further adjust the composition settings. In the **VR Comp Editor** dialog, click **Properties**. Adjust the properties and click **Save**. Click **Delete** to delete the saved settings.



Edit 2D properties



Edit 3D properties

7 You can orbit your field of view to check how your footage looks to the user with a VR headset. Select the **Edit 1** composition and use the **Camera** tool to drag the composition around. You can use the 360 view of your footage to change the field of view and look for a point to add elements to. Change the number views to view different camera angles.

8 Add elements such as graphics, text elements, and effects to your composition and view the results in your **Output** composition. If the results do not reflect in the output composition, click **Open Output/Render** in the **VR Comp Editor** to refresh the comp.

Tip: If you are working with 3D edit, then change the element that you add to your composition into a 3D layer. Enable the 3D layer toggle in the **Timeline** panel.

Edit 1 non-warped composition

Output equirectangular composition

Assorted animation tools

Motion paths

When you animate spatial properties—including Position, Anchor Point, and effect control point properties—the motion is shown as a motion path. A motion path appears as a sequence of dots, where each dot marks the position of the layer at each frame. A box in the path marks the position of a keyframe.

Motion paths are simply an alternative visual, spatial way of viewing and working with spatial properties and their keyframes, in addition to the ways that you work with properties in the Timeline panel. You can modify a motion path by changing an existing keyframe or adding a keyframe. You can modify the shape of a motion path by changing the spatial interpolation methods for its keyframes. (See About spatial and temporal keyframe interpolation.)

The density of dots between the boxes in a motion path indicates the relative speed of the layer or effect control point. Dots close together indicate a lower speed; dots farther apart indicate a greater speed.

Note:

Right-click (Windows) or Command-click (Mac OS) a keyframe to open its context menu.

Using the Pen tool or Selection tool to edit keyframes for a spatial property in the Composition or Layer panel is like modifying a Bezier path for a mask or for a shape on a shape layer. (See About paths.)

A motion path is less complex and generally easier to modify when you use fewer keyframes to describe the path. You can use the Smoother to remove extraneous keyframes from a motion path.

Show motion path controls

Position motion paths appear in the Composition panel. Anchor Point and effect control point motion paths appear in the Layer panel.

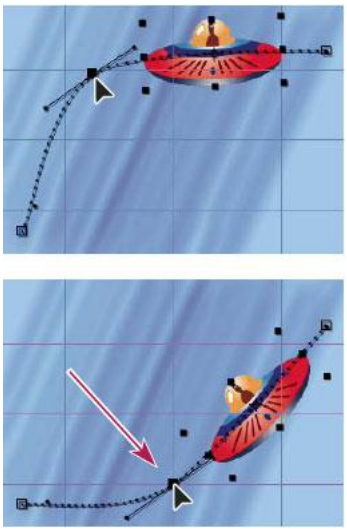
- To show motion path controls in the Composition panel, choose View > View Options, and select Effect Controls, Keyframes, Motion Paths, and Motion Handles. To see a Position motion path in the Composition panel, the Position property must be selected.
- To show motion path controls in the Layer panel, choose the property or effect from the View menu at the bottom of the Layer panel.
- To specify how many keyframes to show for a motion path, choose Edit > Preferences > Display (Windows) or After Effects > Preferences > Display (Mac OS), and select an option in the Motion Path section.
- To specify the size of Bezier direction handles for motion paths, choose Edit > Preferences > General (Windows) or After Effects > Preferences > General (Mac OS), and edit the Path Point Size value.

Move motion path keyframes

1. In the Timeline panel, select the layer for which to modify the motion path.
2. If you cannot see the keyframe that you want to modify in the Composition panel or Layer panel, move the current-time indicator to the keyframe.
3. In the Composition panel or Layer panel, use the Selection tool for dragging a keyframe or its handles.

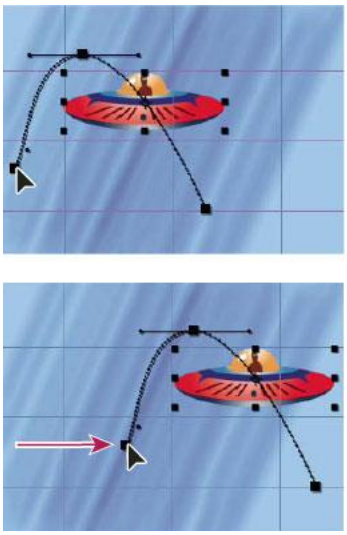
   Note:

   The current-time indicator doesn't need to be on a keyframe before you drag it.



Move one position keyframe by dragging a keyframe in the Composition panel

You can move multiple keyframes at one time by selecting them in the Timeline panel before you drag them in the Composition panel or Layer panel. To move the entire motion path, select all keyframes by clicking the property name in the Timeline panel before dragging a keyframe in the Composition panel.



Dragging all keyframes on a motion path by one keyframe

Add a keyframe to a motion path using the Pen tool

1. Display the motion path that you want to modify in the Composition panel or Layer panel.
2. Select the Pen tool or Add Vertex tool from the Tools panel.
3. In the Composition panel, place the Pen tool over the motion path where you want to add the new keyframe and click to add the keyframe.

   A new keyframe appears at the frame you clicked, on the motion path and in the Timeline panel. To move the keyframe, use the Selection tool.

Note:

Though the results are different, the techniques for manipulating motion-path curves with the Pen tool work in much the same way as the techniques used to create and modify other Bezier paths, such as mask and shape paths.

Sketch a motion path with Motion Sketch

You can draw a path for the motion of a selected layer using Motion Sketch, which records the position of the layer and the speed at which you draw. As you draw, a Position keyframe is generated at each frame.

Motion Sketch does not affect keyframes that you have set for other properties. For example, if you set Rotation keyframes for an image of a ball, you can use Motion Sketch to generate Position keyframes, so that the ball appears to roll along the path you created.

John Dickinson provides a demonstration of Motion Sketch in a video tutorial on his Motionworks website.

1. In the Composition or Timeline panel, select the layer for which you want to sketch a motion path.
2. In the Timeline panel, set the work-area markers to the duration in which you want to sketch motion.
3. If you want to hear the audio in your composition as you sketch, make sure that the Mute Audio button is not selected in the Preview panel.
4. Choose Window > Motion Sketch.
5. Select the appropriate Motion Sketch options:

   Show Wireframe Displays a wireframe view of the layer as you sketch the motion path.

   Show Background Displays the static contents of the frame at which you started sketching in the Composition panel while you sketch. This option is useful if you want to sketch motion relative to other images in your composition.

   Smoothing Eliminates unnecessary keyframes from the motion path. This setting has the same result as using the Tolerance setting with the Smoother. Higher values produce smoother curves, but too high a value may not preserve the shape of the curve that you draw.

   Note:

   You can smooth a motion path after it has been created by using the smooth expression or the Smoother.

   Capture Speed At The ratio of the speed of the recorded motion to the speed of playback. If Capture Speed At is 100%, the motion is played back at the speed at which it was recorded. If Capture Speed At is greater than 100%, the motion plays back slower than it was recorded.
6. Click Start Capture and then drag in the Composition panel to create the motion path. Stop capturing by releasing the mouse button.

   Note:

   After Effects automatically ends capturing when the capture time reaches the end of the work area (which, by default, is the composition duration).

Create a motion path from a mask, shape, or paint path

You can create a motion path from any of several types of paths:

- A Mask Path property
- A shape Path property on a shape layer
- A Path property for a paint stroke
- A path copied from Illustrator or Photoshop

You can paste any of these paths into the Position or Anchor Point property for a layer, or into the position property of an effect control point. The pasted keyframes are set to rove in time, except for the first and last ones, to create a constant velocity along the path.

By default, the duration of the pasted motion path is 2 seconds. You can adjust the duration by dragging the first or last keyframe in the Timeline panel.

1. Copy a path to the clipboard:
   - Select a Path property in the Timeline panel, and choose Edit > Copy.
   - Select a path in Illustrator or Photoshop, and choose Edit > Copy.
2. In the Timeline panel, select the property into which to paste the path.
3. Place the current-time indicator at the time for the first keyframe of the motion path.
4. Choose Edit > Paste.

Andrew Devis shows how to use paths from Illustrator as motion paths in After Effects in this video on the Creative COW website.

Motion blur

When you view one frame of motion-picture film or video containing a moving object, the image is often blurred, because a frame represents a sample of time (in film, a frame is 1/24 of a second long). In that time, a moving object occupies more than one position as it travels across the frame, so it doesn't appear as a sharp, still object. The faster the object moves, the more it is blurred. The camera shutter angle and shutter phase also affect the appearance of the blur, determining how long the shutter stays open and when the shutter opens relative to the beginning of the frame.

In contrast, in a single frame of a computer-generated animation, you may not be able to tell which objects are moving because all moving objects may appear as sharp and clear as nonmoving objects. Without motion blur, layer animation produces a strobe-like effect of distinct steps instead of an appearance of continuous change. Adding motion blur to layers that you animate in After Effects makes motion appear smoother and more natural.

You enable motion blur for each layer individually, and you also determine whether the motion blur is rendered for previews and final output. Use the Enable Motion Blur composition switch at the top of the Timeline panel to enable or disable motion blur rendering for previews. Modify the render settings in the Render Queue panel to enable or disable motion blur rendering for final output. If the Switches Affect Nested Comps preference in the General preferences category is enabled, then nested compositions obey the setting for the compositions in which they're contained. (See About precomposing and nesting.)

Motion blur slows rendering, so you may want to disable the composition switch while working, and only enable it to see the finished result.

To enable motion blur for a layer, do one of the following:

- Click the Motion Blur layer switch for the layer in the Timeline panel.
- Select the layer and choose Layer > Switches > Motion Blur.

The number of samples that After Effects uses to calculate motion blur adapts for each layer, depending on the motion of that layer. This adaptivity provides high-quality motion blur without unnecessarily sampling the motion of a slow-moving layer as frequently as the motion of a fast-moving layer. High sampling rates decrease rendering performance.

When motion blur is enabled for a composition and the Timeline panel is zoomed in so that you can see individual frames, a light gray region around the current-time indicator indicates the shutter phase and shutter angle. The width of the column shows the shutter angle, and the offset of the column shows the shutter phase. This visual indication shows how individual frames are sampled to calculate motion blur within this composition.

You can use motion blur when you animate a layer—for example, moving a layer of text across the screen. You cannot add motion blur to motion that exists within a layer by means of the Motion Blur layer switch and Enable Motion Blur composition switch.

If you want to smooth live-action video to which you assigned a frame rate much lower or higher than the original, use frame blending, not motion blur.

To create a fake motion blur, see Apply motion blur.

Motion blur settings in the Advanced tab of Composition Settings

Samples Per Frame The minimum number of samples. This minimum is the number of samples used for frames for which After Effects is not able to determine an adaptive sampling rate based on layer motion. This sample rate is used for 3D layers and shape layers.

Adaptive Sample Limit The maximum number of samples.

Shutter Angle The shutter angle is measured in degrees, simulating the exposure allowed by a rotating shutter. The shutter angle uses the footage frame rate to determine the simulated exposure, which affects the amount of motion blur. For example, entering 90° (25% of 360°) for 24-fps footage creates an effective exposure of 1/96 of a second (25% of 1/24 of a second). Entering 1° applies almost no motion blur, and entering 720° applies a large amount of blur.

Shutter Phase The shutter phase is also measured in degrees. It defines an offset that determines when the shutter opens relative to the beginning of a frame. Adjusting this value can help if an object with motion blur applied appears to lag behind the position of the object without motion blur applied.

A Shutter Phase value that is -1/2 of the Shutter Angle value is best for a layer that is composited on top of another using motion tracking data. (For example, Shutter Phase = -90, Shutter Angle = 180.) This setting combination causes a blur that is centered on the original object.

Apply motion blur to a mask

Motion blur creates a blur based on the movement of a mask in the composition. You can apply motion blur to individual masks. Within each composition, the Enable Motion Blur composition switch must be selected for any layer or any mask within a layer to exhibit motion blur.

1. Select one or more masks.
2. Choose Layer > Masks > Motion Blur, and choose one of the following options:

   Same As Layer The mask has motion blur only if the Motion Blur switch is selected for the layer.

   On The mask will have motion blur regardless of the setting of the Motion Blur switch for the layer.

   Off The mask will not have motion blur.

Additional resources about motion blur

When you shoot a fast-moving object, there is motion blurring when the object is rendered. Also, if you shoot moving objects with a high shutter speed, the objects appear to jump between frames leading to strobed motion.

The Pixel Motion Blur effect in After Effects CC tracks the movement of pixels between frames. The effect analyzes a clip to determine what parts are in motion, creates a set of motion vectors, and then uses that information to add motion blur within the frame.

If the object moves too fast, increase the value of **Shutter Samples** to create more in-between frames. Increase the value of **Vector Detail** to minimize the possibility of errors when pixel groups are analyzed between frames.

Chris and Trish Meyer have provided a video tutorial for Pixel Motion Blur effect in the ProVideo Coalition website.

Todd Kopriva has blogged about this effect in the After Effects official blog.

For more information about other time effects in After Effects, see Time effects.

Mark Christiansen explains some of the concepts surrounding motion blur, shutter speed, and shutter angle on the ProVideo Coalition website.

Andrew Kramer provides a video tutorial on his Video Copilot website in which he demonstrates the advantages of using 32-bpc color with motion blur. (See Color depth and high dynamic range color.)

Smooth motion and velocity by removing extra keyframes

Smooth motion paths, value curves, and velocity curves to eliminate bumpiness or excess keyframes using the Smoother, which adds keyframes or removes unnecessary keyframes.

You can also use the smooth expression method for this purpose, without removing keyframes. (See Property attributes and methods (expression reference).)

Although you can smooth a curve for any property, the Smoother is most useful when applied to curves automatically generated by Motion Sketch, where you may have excess keyframes. Applying the Smoother to keyframes that have been set manually may result in unexpected changes to the curve.

Note:

To avoid the need to use the Smoother on a path generated by Motion Sketch, set the Smoothing option in the Motion Sketch panel before sketching the motion path.

When you apply the Smoother to properties that change spatially (such as Position), you can smooth only the spatial curve (the curve defined by the motion). When you apply the Smoother to properties that change only in time (such as Opacity), you can smooth only the value and velocity curves (the curve defined by the value or the velocity).

In addition to adding keyframes or eliminating unnecessary keyframes, the Smoother also applies Bezier interpolation at each keyframe when smoothing the temporal curve. (See Keyframe interpolation methods.)

1. In the Timeline panel, either select all the keyframes for a property to smooth the entire curve, or select at least three keyframes to smooth only a portion of a curve.
2. Choose Window > Smoother. In the Apply To menu, the Smoother automatically selects Spatial Path or Temporal Graph, depending on the type of property for which you selected keyframes in step 1.
3. Set a value for Tolerance. The units of Tolerance match the units of the property you are smoothing. New keyframe values vary no more than the specified value from the original curve. Higher values produce smoother curves, but too high a value may not preserve the original shape of the curve.
4. Click Apply and preview the results.
5. If necessary, choose Edit > Undo Smoother to reset the keyframes, adjust the value for Tolerance, and then reapply the Smoother.

Add randomness to a property with the Wiggler

You can add randomness to any property as it varies over time by using the Wiggler.

You can also use the wiggle expression method for this purpose. Usually, it is easier to use the expression than to use the Wiggler. (See Property attributes and methods (expression reference).)

Depending on the property and the options you specify, the Wiggler adds a certain number of deviations to a property by adding keyframes and randomizing interpolations coming into or out of existing keyframes. You need at least two keyframes to use the Wiggler.

Using the Wiggler, you can more closely simulate natural movement within specified limits. For example, add randomness to an animated butterfly to produce fluttering. Simulate the flicker of an old projector by adding it to brightness or opacity.

1. Select a range of keyframes for the property.
2. Choose Window > Wiggler.
3. For Apply To, select the type of curve you want the Wiggler to change. If you selected keyframes for a property that varies spatially, you can select Spatial Path to add deviations to the motion, or Temporal Graph to add deviations to the velocity. If you selected keyframes for a property that does not vary spatially, you can select only Temporal Graph.
4. Select a Noise Type option to specify the type of deviation due to randomly distributed pixel values (noise):

   Smooth Noise Produces deviations that occur more gradually, without sudden changes.

   Jagged Noise Produces sudden changes.
5. Select the dimensions of the property you want to affect:

   X, Y, or Z Adds deviations to only one dimension of the selected property. Choose the dimension from the menu.

   All Independently Independently adds a different set of deviations to each dimension.

   All The Same Adds the same set of deviations to all dimensions.
6. Set Frequency to specify how many deviations (keyframes) per second After Effects adds to the selected keyframes. A low value produces only occasional deviations, while a high value produces more erratic results. A value less than 1 creates keyframes at intervals of less than one per second. For example, a value of 0.5 creates one keyframe every 2 seconds.
7. Set Magnitude to specify the maximum size of the deviations. After Effects sets the specified magnitude to the units of the selected property, so a value for one property may produce different results in another property.
8. Click Apply and preview the results.
9. If necessary, choose Edit > Undo Wiggler to reset the keyframes, adjust the values for Frequency and Magnitude, and then reapply the Wiggler.

Convert audio to keyframes

The Convert Audio To Keyframes keyframe assistant analyzes audio amplitude within the work area and creates keyframes for audio amplitude.

? With the composition active in the Composition panel or Timeline panel, choose Animation > Keyframe Assistant > Convert Audio To Keyframes.

This keyframe assistant creates an Audio Amplitude layer representing all audio sources in the composition, with three Expression Controls effects with Slider properties that contain the keyframes: Left Channel, Right Channel, and Both Channels.

To use the keyframes created by this keyframe assistant, link the changes in audio amplitude to other layer properties. For example, use an expression to link the audio keyframes to the Scale property of a layer to make the layer grow and shrink as the amplitude increases and decreases.

Online resources for converting audio to keyframes

Aharon Rabinowitz provides a video tutorial on the Creative COW website that shows how to link the audio amplitude keyframes to other properties—in this case the properties of the Wave Warp effect, to synchronize animation with sound.

Nathan Gambles provides an expression on the Video Copilot website that ducks (reduces the volume of) audio on one layer when the volume of audio on another layer increases. This technique is useful, for example, for automatically decreasing the volume of a soundtrack when dialog occurs. This expression for the Stereo Mixer effect depends on the Convert Audio To Keyframes keyframe assistant having been applied to the other audio layer.

Lloyd Alvarez provides a script on his After Effects Scripts website that adds markers, splits a layer, or adds a text layer with incrementing numbers based on audio intensity.

Andrew Devis provides a pair of video tutorials on the Creative COW website that show in detail how to use the *linear* expression method along with the Convert Audio To Keyframes command.

Setting, selecting, and deleting keyframes

What are keyframes?

Keyframes are used to set parameters for motion, effects, audio, and many other properties, usually changing them over time. A keyframe marks the point in time where you specify a value for a layer property, such as spatial position, opacity, or audio volume. Values between keyframes are interpolated. When you use keyframes to create a change over time, you typically use at least two keyframes—one for the state at the beginning of the change, and one for the new state at the end of the change.

When the stopwatch is active for a specific property, After Effects automatically sets or changes a keyframe for the property at the current time whenever you change the property value. When the stopwatch is inactive for a property, the property has no keyframes. If you change the value for a layer property while the stopwatch is inactive, that value remains the same for the duration of the layer.

Set or add keyframes

When the stopwatch is active for a specific property, After Effects automatically adds or changes a keyframe for the property at the current time whenever you change the property value.

To activate the stopwatch and enable keyframing, do one of the following

- Click the Stopwatch icon next to the property name to activate it. After Effects creates a keyframe at the current time for that property value.
- Choose Animation > Add *[x]* Keyframe, where *[x]* is the name of the property you are animating.

Add a keyframe without changing a value

? Do one of the following:

- Click the keyframe navigator button for the layer property.
- Choose Animation > Add *[x]* Keyframe, where *[x]* is the name of the property you are animating.
- Click a segment of the layer property's graph in the Graph Editor with the Pen tool .

Auto-keyframe mode

To turn auto-keyframe mode on, choose **Enable Auto-keyframe** from the **Timeline** panel menu. When Auto-keyframe mode is enabled, modifying a property automatically activates its stopwatch and adds a keyframe at the current time.

Note:

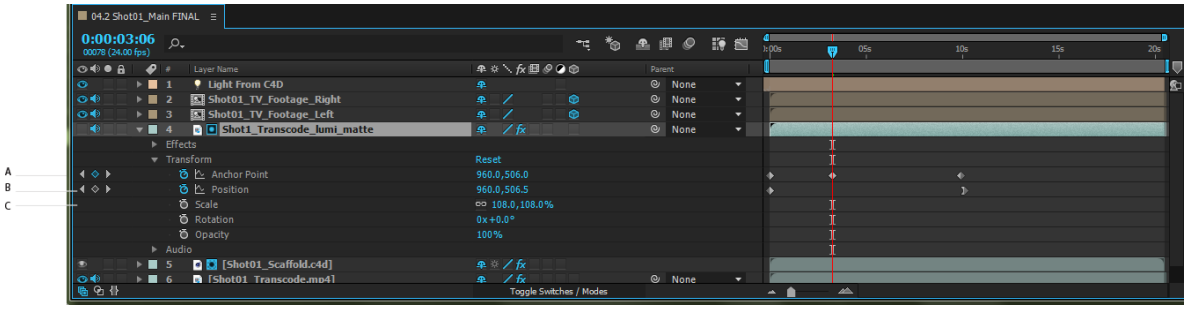
Auto-keyframe mode doesn't automatically activate the stopwatch for properties that aren't interpolated, such as menus, checkboxes, and the Source Text property.

Auto-keyframe mode is off by default. When Auto-keyframe mode is off, modifying properties and animating with keyframes behave as in previous versions of After Effects.

Move the current-time indicator (CTI) to a keyframe

After you set the initial keyframe for a property, After Effects displays the keyframe navigator. You can use the keyframe navigator to move from keyframe to keyframe or to set or remove keyframes. When the keyframe navigator box is filled with a diamond, the current-time indicator lies precisely at a keyframe for that layer property. When the keyframe navigator box is not filled , the current-time indicator lies between keyframes.

To detach the keyframe navigator from the A/V Features column to function as its own column, choose Column > Keys from the Timeline panel menu.



Keyframe navigator in Timeline panel
***A** Keyframe at current time **B** No keyframe at current time **C** No keyframes for layer property*

- To move to the next or previous keyframe, click a keyframe navigator arrow.
- To snap to a keyframe or marker, Shift-drag the current-time indicator.
- To move to the next or previous visible item in the time ruler (keyframe, marker, or work area end), press K or J.

For instructions for moving the current-time indicator to other elements and times, see Move the current-time indicator (CTI).

Select keyframes

In layer bar mode, selected keyframes are blue. Unselected keyframes are gray.

In Graph Editor mode, the appearance of a keyframe icon depends on whether the keyframe is selected, unselected, or semi-selected (another keyframe in the same property is selected). Selected keyframes are solid yellow. Unselected keyframes retain the color of their corresponding graph. Semi-selected keyframes are represented by a hollow yellow box.

- To select a keyframe, click the keyframe icon.
- To select multiple keyframes, Shift-click the keyframes or drag a marquee (selection box) around the keyframes. If a keyframe is selected, Shift-clicking it deselects it; Shift-dragging to draw a marquee around selected keyframes deselects them.

Note:

To toggle viewing of the free-transform bounding box in the Graph Editor, click the Show Transform Box button *at the bottom of the Graph Editor.*

- To select all keyframes for a layer property, Alt-click (Windows) or Option-click (Mac OS) a segment between two keyframes in the Graph Editor, or click the layer property name in the layer outline.
- To select all keyframes for a property that have the same value, right-click (Windows) or Control-click (Mac OS) a keyframe, and choose Select Equal Keyframes.
- To select all keyframes that follow or precede a selected keyframe, right-click (Windows) or Control-click (Mac OS) a keyframe, and choose Select Previous Keyframes or Select Following Keyframes.

Note:

The Select Previous/Following Keyframes commands aren't available if more than one keyframe is selected.

Keyframe menu commands

When you select one or more keyframes, the keyframe menu becomes available at the bottom of the Graph Editor.

To open the keyframe menu, right-click (Windows) or Control-click (Mac OS) a keyframe.

[Value] Displays the value of the selected keyframe. If more than one keyframe is selected, the Display Value command is available, which displays the value of the highlighted keyframe in the selection.

Edit Value Opens a dialog box in which you can edit the value of the keyframe.

Select Equal Keyframes Selects all keyframes in a property that have the same value.

Select Previous Keyframes Selects all keyframes preceding the currently selected keyframe.

Select Following Keyframes Selects all keyframes following the currently selected keyframe.

Toggle Hold Keyframe Holds the property value at the value of the current keyframe until the next keyframe is reached.

Keyframe Interpolation Opens the Keyframe Interpolation dialog box.

Rove Across Time Toggles Rove Across Time for spatial properties.

Keyframe Velocity Opens the Keyframe Velocity dialog box.

Keyframe Assistant Opens a submenu with the following options:

Convert Audio To Keyframes Analyzes amplitude within the composition work area and creates keyframes to represent the audio.

Convert Expression To Keyframes Analyzes the current expression and creates keyframes to represent the property values it describes.

Easy Ease Automatically adjusts the influence into and out of a keyframe to smooth out sudden changes.

Easy Ease In Automatically adjusts the influence into a keyframe.

Easy Ease Out Automatically adjusts the influence out of a keyframe.

Exponential Scale Converts the rate of change in scale from linear to exponential.

RPF Camera Import Imports RPF camera data from third-party 3D modeling applications.

Sequence Layers Opens the Sequence Layers assistant.

Time-Reverse Keyframes Reverses selected keyframes in time.

Delete or disable keyframes

- To delete any number of keyframes, select them, and then press the Delete key.
- To delete one keyframe in the Graph Editor, Ctrl-click (Windows) or Command-click (Mac OS) a keyframe with the Selection tool.
- To delete all keyframes for one layer property, click the stopwatch button to the left of the name of the layer property to deactivate it.

  When you click the stopwatch button to deactivate it, keyframes for that property are permanently removed and the value of that property becomes the value at the current time. You cannot restore deleted keyframes by clicking the stopwatch button again. Deleting all keyframes does not delete or disable expressions.
- To temporarily disable keyframes for a property, add an expression that sets the property to a constant value. For example, you can add this very simple expression to the Opacity property to set it to 100%: *100*.

Click the Enable Expression button to toggle the expression on and off, which toggles the keyframes off and on as a side effect.

If you accidentally delete keyframes, choose Edit > Undo.

Jeff Almasol provides a script on his redefinery website that automatically removes keyframes based on specified criteria—for example, all keyframes in the work area, all odd-numbered keyframes.

Editing, moving, and copying keyframes

View or edit a keyframe value

Before you change a keyframe, make sure that the current-time indicator is positioned at an existing keyframe. If you change a property value when the current-time indicator is not at an existing keyframe, After Effects adds a new keyframe. However, if you double-click a keyframe to modify it, the current-time indicator location is not relevant, nor is it relevant when you change the interpolation method of a keyframe.

- Move the current-time indicator to the time of the keyframe. The value of the property appears next to the property name, where you can edit it.
- Right-click (Windows) or Control-click (Mac OS) the keyframe. The keyframe value appears at the top of the context menu that appears. Choose Edit Value to edit the value, if desired.
- Place the pointer over a keyframe in layer bar mode to see the time and value of the keyframe.
- Place the pointer over a keyframe in Graph Editor mode to see the layer name, property name, time, and value of the keyframe. Place the pointer over a segment between keyframes to see the corresponding information at any time.
- Click a keyframe in layer bar mode to show the keyframe's time and interpolation method in the Info panel.
- Click a keyframe or segment between keyframes in Graph Editor mode to show a property's minimum and maximum values and the speed at the current time in the Info panel.
- Alt-click (Windows) or Option-click (Mac OS) two keyframes in layer bar mode to display the duration between them in the Info panel.

Jeff Almasol provides a script on his redefinery website that creates new layer markers (either on the selected layer or on a new null layer) with comments that provide information about keyframes at the same times.

Copy and paste keyframes

You can copy keyframes from only one layer at a time. When you paste keyframes into another layer, they appear in the corresponding property in the destination layer. The earliest keyframe appears at the current time, and the other keyframes follow in relative order. The keyframes remain selected after pasting, so you can immediately move them in the destination layer.

You can copy keyframes between layers for the same property (such as Position) or between different properties that use the same type of data (such as between Position and Anchor Point).

Note:

When copying and pasting between the same properties, you can copy from more than one property to more than one property at a time. However, when copying and pasting to different properties, you can copy only from one property to one property at a time.

1. In the Timeline panel, display the layer property containing the keyframes you want to copy.
2. Select one or more keyframes.
3. Choose Edit > Copy.
4. In the Timeline panel containing the destination layer, move the current-time indicator to the point in time where you want the keyframes to appear.
5. Do one of the following:
   - To paste to the same property of the copied keyframes, select the destination layer.
   - To paste to a different property, select the destination property.
6. Choose Edit > Paste.

Edit keyframe values using a spreadsheet or text editor

You can copy and paste keyframe data as tab-delimited text for use in a spreadsheet program (such as Microsoft Excel) or other text-editing program. You can use a spreadsheet program to perform numerical analysis on keyframe data or create or edit keyframe values.

You can copy and paste most properties, including the Transform properties (such as Position and Opacity), Material Options properties, and motion trackers.

You can use the motion tracking tools to track the motion of an object in a layer, and then paste the tracker data into a spreadsheet to perform numerical analysis on the data.

Some utility applications, such as Imagineer Systems mocha for After Effects (mocha-AE), copy keyframe data to the clipboard so that you can paste it into the appropriate layer in After Effects.

You can copy keyframes from only one layer at a time as tab-delimited text.

1. In the Timeline panel, select keyframes for one or more properties on the same layer. To select all keyframes for a property, click the name of the property.
2. Move the current-time indicator to the first selected keyframe.

   Place a composition marker at the time of the first selected keyframe so that you will know where to paste the modified keyframes in the last step. (See Layer markers and composition markers.)
3. With the keyframes selected, choose Edit > Copy.
4. Paste keyframe data into the spreadsheet. Assuming that the first column in the spreadsheet is labeled A and the first row is labeled 1, you should paste into cell A1. Frame numbers appear in column B. Property values appear in columns C, D, and E, depending on the dimensions of the property. (Position in a 3D layer has values in all three columns; Opacity has only a value in column C.)
5. Edit the numerical information for the keyframes. Do not change any text other than frame numbers and property values.
6. Select the cells that contain your data. The upper-left cell in your selection should be A1. The bottom row of your selection should be the row that contains the text End of Keyframe Data.
7. Copy the data from the spreadsheet.
8. In After Effects, move the current-time indicator to the time at which you want to paste the new keyframe data. This time is usually the time of the first keyframe that you selected and copied at the beginning of this procedure.
9. Choose Edit > Paste.

Move keyframes in time

You can move keyframes in time, either individually or as a group.

Jeff Almasol provides a versatile script on his redefinery website that creates a panel with controls for moving various combinations of items in time—layer In point, layer Out point, layer source frames, keyframes, and markers.

Move keyframes to another time

With multiple keyframes selected, you can copy or delete them simultaneously or move the keyframes together without changing their positions relative to each other.

1. Select one or more keyframes.
2. Drag any of the selected keyframe icons to the desired time. If you selected multiple keyframes, then all of the selected keyframes maintain their relative distance from the keyframe that you drag.

You can also move selected keyframes in time (one frame earlier or later) by pressing the Alt (Windows) or Option (Mac OS) key with the left arrow or right arrow key.

Move a keyframe to a specific time

1. Move the current-time indicator to the desired time.
2. Do one of the following:
   - In layer bar mode, hold down Shift after you begin to drag a keyframe icon to the current-time indicator.
   - In Graph Editor mode, drag a keyframe to the current-time indicator.

   When you drag over the current-time indicator, the keyframe snaps to the current-time indicator.

Expand or contract a group of keyframes in layer bar mode

1. Select at least three keyframes.
2. Hold down Alt (Windows) or Option (Mac OS) and drag the first or last selected keyframe to the desired time.

Move a layer duration bar but not its keyframes

1. Place a composition marker at the time at which the first keyframe appears. (See Create composition markers.)
2. In the layer outline, click the name of one or more layer properties containing the keyframes you want to keep at the same times.
3. Choose Edit > Cut.
4. Move or stretch the layer duration bar to its new In and Out points.
5. Move the current-time indicator to the composition marker at the time at which the first keyframe appeared before you cut the keyframes.
6. Choose Edit > Paste.

Change multiple keyframe values at once

You can change the values of multiple keyframes on multiple layers at one time; however, all keyframes you select must belong to the same layer property. The way the selected values change depends on the method you use to make the change:

- If you change a value numerically, all selected keyframes use the new value exactly. In other words, you make an *absolute* change. For example, if you select several Position keyframes on a motion path and numerically specify a Position value for one of them, all selected keyframes change to the same position value.

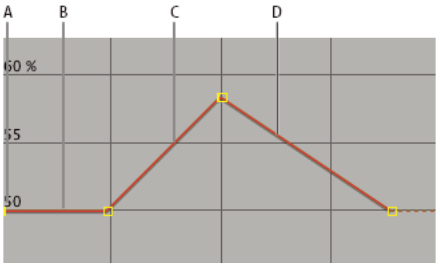
- If you change a value by dragging the underlined value, all selected keyframes change by the same amount. In other words, you make a *relative* change. For example, if you select several Position keyframes on a motion path and drag the underlined value for one of them, all selected keyframe values change by the same amount.
- If you change a value graphically in the Composition or Layer panel, all selected keyframes change using the difference between the old and new values, not the values themselves. In other words, you make a relative change. For example, if you select several Position keyframes on a motion path and then drag one of them 10 pixels to the left, they all move 10 pixels to the left of their original positions.

You can also change the value of several layers at once in layer bar mode by parenting them.

Mathias Möhl provides the KeyTweak script (available on the After Effects Extension page), with which you can modify many keyframes on a property simultaneously. With KeyTweak, you can modify a few keyframes manually, and the script modifies the remaining keyframes in between accordingly. KeyTweak is especially useful for Mask Path keyframes in a rotoscoping workflow. (See Rotoscoping introduction and resources.)

Move or change keyframes in the Graph Editor

A value graph in the Graph Editor displays the values for each keyframe and the interpolated values between keyframes. When the value graph of a layer property is level, the value of the property is unchanged between keyframes. When the value graph goes up or down, the value of a layer property increases or decreases between keyframes.



Value graph
***A** Keyframe. **B** A level value graph indicates unchanging values. **C** A rising graph indicates increasing values. **D** A falling graph indicates decreasing values.*

You can change layer property values by moving the points (keyframes) on the value graph up or down. For example, you can increase the value of a Rotation keyframe by dragging the keyframe marker on the Rotation property's value graph higher up on the graph.

Note:

Values for the Anchor Point, Mask Path, effect control points, 3D Orientation, and Position properties are spatial, so they use speed graphs by default instead of value graphs.

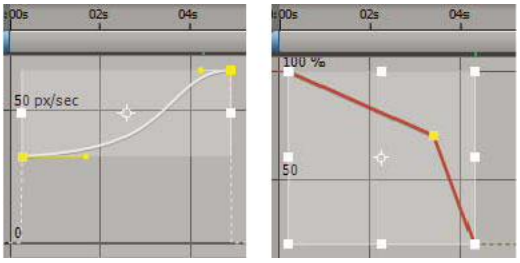
Modify a single keyframe in the Graph Editor

1. In the Timeline panel, show a temporal property for a layer.
2. If necessary, click the Graph Editor button or press Shift+F3 to enter Graph Editor mode.
3. If necessary, add a keyframe at the point in time you want the change to occur.
4. Drag the keyframe up or down to set a new value for the layer property.

Modify multiple keyframes in the Graph Editor

You can edit and move multiple keyframes simultaneously using the Graph Editor. When you select multiple keyframes with the Show Transform Box button selected, a free-transform bounding box surrounds the selected keyframes, and an anchor point appears in the center of the bounding box to mark the center point for the transformation. You can move the selected keyframes in time or value by dragging the bounding box or its handles. You can also change the position of the anchor point.

Adjusting a free-transform bounding box in a value graph moves the selected keyframes in time and value. Adjusting a free-transform bounding box in a speed graph moves the selected keyframes in time only.



When you select multiple keyframes in the Graph Editor, a free-transform bounding box appears.

1. Switch to the Graph Editor view and display the keyframes you want to adjust.
2. Using the Selection tool, do one of the following:
   - To select keyframes, Shift-click the keyframes or drag to draw a marquee around the keyframes.
   - To select all keyframes for a property, Alt-click (Windows) or Option-click (Mac OS) a segment between two keyframes.
3. Do any of the following:
   - To move keyframes in time or value, place the pointer inside the bounding box and drag. Shift-drag to constrain the move horizontally or vertically.
   - To move keyframes in time or value by scaling the bounding box, place the pointer on a bounding box handle. When the pointer changes to a straight, double-sided arrow ↔, drag the bounding box to a new size. Shift-drag to constrain the ratio of width to height. Ctrl-drag (Windows) or Command-drag (Mac OS) to scale around the anchor point of the bounding box. When dragging a corner handle, Alt-drag (Windows) or Option-drag (Mac OS) to move only that handle.

Scale by negative amounts to reverse the keyframes in time.

To taper keyframe values vertically, Ctrl+Alt-drag (Windows) or Command+Option-drag (Mac OS). Tapering keyframe values allows you to reduce or expand the amplitude of a repeated animation.

To move one side of the bounding box up or down, Ctrl+Alt+Shift-drag (Windows) or Command+Option+Shift-drag (Mac OS).

To move the anchor point of the bounding box, place the Selection tool over the anchor point until the tool changes to the Move Anchor Point tool, and then drag.

Keyframe interpolation

About spatial and temporal keyframe interpolation

Interpolation is the process of filling in the unknown data between two known values. You set keyframes to specify a property's values at certain key times. After Effects interpolates values for the property for all times between keyframes.

Because interpolation generates the property values *between* keyframes, interpolation is sometimes called *tweening*. Interpolation between keyframes can be used to animate movement, effects, audio levels, image adjustments, transparency, color changes, and many other visual and audio elements.

After you create keyframes and motion paths to change values over time, you may want to make more precise adjustments to the way that change occurs. After Effects provides several interpolation methods that affect how the in-between values are calculated.

Temporal interpolation is the interpolation of values in time; *spatial interpolation* is the interpolation of values in space. Some properties—such as Opacity—have only a temporal component. Other properties—such as Position—also have spatial components.

Temporal interpolation and the value graph

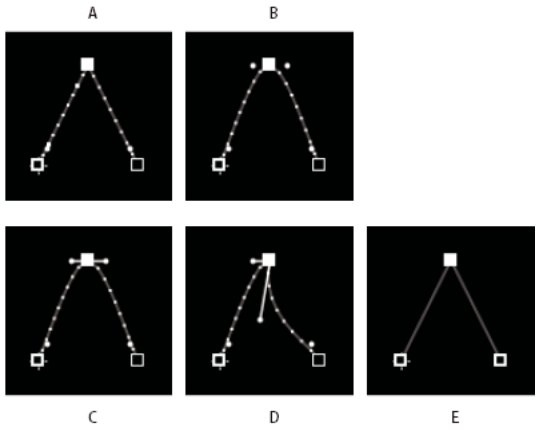
Using the value graph in the Graph Editor, you can make precise adjustments to the temporal property keyframes you've created for your animation. The value graph displays x values as red, y values as green, and z values (3D only) as blue. The value graph provides complete information about the value of keyframes at any point in time in a composition and allows you to control it. In addition, the Info panel displays the temporal interpolation method of a selected keyframe.

Spatial interpolation and the motion path

When you apply or change spatial interpolation for a property such as Position, you adjust the motion path in the Composition panel. The different keyframes on the motion path provide information about the type of interpolation at any point in time. The Info panel displays the spatial interpolation method of a selected keyframe.

When you create spatial changes in a layer, After Effects uses Auto Bezier as the default spatial interpolation.

To change the default to linear interpolation, choose Edit > Preferences > General (Windows) or After Effects > Preferences > General (Mac OS), and select Default Spatial Interpolation To Linear. Changing the preference setting does not affect keyframes that already exist or new keyframes on properties for which keyframes already exist.



Motion path interpolation
***A** Linear **B** Auto Bezier **C** Continuous Bezier **D** Bezier **E** Hold*

In some cases, the Auto Bezier spatial interpolation for Position keyframes can cause undesired back-and-forth (*boomerang*) motion between two keyframes with equal values. In such a case, you can change the earlier keyframe to use Hold interpolation or change both keyframes to use Linear interpolation.

Online resources about keyframe interpolation

Aharon Rabinowitz provides a pair of video tutorials on the Creative COW website that describe the issue and solution for the boomerang motion problem that arises from unintentionally having Auto Bezier spatial interpolation set for keyframes of equal value:

- Part 1
- Part 2

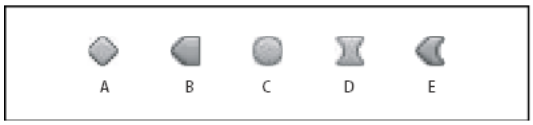
Antony Bolante provides information and illustrations about keyframe interpolation in an article on the Peachpit Press website.

Keyframe interpolation methods

In layer bar mode, the appearance of a keyframe icon depends on the interpolation method you choose for the interval between keyframes. When half of the icon is dark gray ◆, the dark half indicates that no keyframe is adjacent to that side, or that its interpolation is overridden by the Hold interpolation applied to the preceding keyframe.

By default, a keyframe uses one interpolation method, but you can apply two methods: the incoming method applies to the property value as the current time approaches a keyframe, and the outgoing method applies to the property value as the current time leaves a keyframe. When you set different incoming and outgoing interpolation methods, the keyframe icon in layer bar mode changes accordingly. It displays the left half of the incoming interpolation icon and the right half of the outgoing interpolation icon.

To toggle between keyframe icons and keyframe numbers, select Use Keyframe Icons or Use Keyframe Indices from the Timeline panel menu.



Examples of keyframe icons in Timeline panel in layer bar mode
***A** Linear **B** Linear in, Hold out **C** Auto Bezier **D** Continuous Bezier or Bezier **E** Linear in, Bezier out*

All interpolation methods used by After Effects are based on the *Bezier* interpolation method, which provides direction handles so that you can control the transitions between keyframes. Interpolation methods that don't use direction handles are constrained versions of Bezier interpolation and are convenient for certain tasks.

To learn more about how different interpolation methods affect temporal properties, experiment by setting up at least three keyframes with different values for a temporal layer property—such as Opacity—and change the interpolation methods as you view the value graph in Graph Editor mode in the Timeline panel.

To learn more about how different interpolation methods affect a motion path, experiment by setting up three keyframes for a spatial property—such as Position—with different values on a motion path, and change the interpolation methods as you preview the motion in the Composition panel.

Note:

To change interpolation methods, right-click a keyframe, select Keyframe Interpolation from the menu that appears, and then select an option from the Temporal Interpolation menu.

To clarify the examples in the following descriptions of interpolation methods, the result of each method is described as if you had applied it to all of the keyframes for a layer property. In practice, you can apply any available interpolation method to any keyframe.

No interpolation

No interpolation is the state in which a layer property has no keyframes—when the stopwatch is turned off and the I-beam icon appears in the Timeline panel under the current-time indicator. In this state, when you set the value of a layer property, it maintains that value for the duration of the layer, unless overridden by an expression. By default, no interpolation is applied to a layer property. If any keyframes are present for a layer property, some type of interpolation is in use.

Linear interpolation

Linear interpolation creates a uniform rate of change between keyframes, which can add a mechanical look to animations. After Effects interpolates the values between two adjacent keyframes as directly as possible without accounting for the values of other keyframes.

If you apply Linear interpolation to all keyframes of a temporal layer property, change begins instantly at the first keyframe and continues to the next keyframe at a constant speed. At the second keyframe, the rate of change switches immediately to the rate between it and the third keyframe. When the layer reaches the final keyframe value, change stops instantly. In the value graph, the segment connecting two keyframes with Linear interpolation appears as a straight line.

Bezier interpolation

Bezier interpolation provides the most precise control because you manually adjust the shape of the value graph or motion path segments on either side of the keyframe. Unlike Auto Bezier or Continuous Bezier, the two direction handles on a Bezier keyframe operate independently in both the value graph and motion path.

If you apply Bezier interpolation to all keyframes of a layer property, After Effects creates a smooth transition between keyframes. The initial position of the direction handles is calculated using the same method used in Auto Bezier interpolation. After Effects maintains existing direction handle positions as you change a Bezier keyframe value.

Unlike other interpolation methods, Bezier interpolation lets you create any combination of curves and straight lines along the motion path. Because the two Bezier direction handles operate independently, a curving motion path can suddenly turn into a sharp corner at a Bezier keyframe. Bezier spatial interpolation is ideal for drawing a motion path that follows a complex shape, such as a map route or the outline of a logo.

Existing direction handle positions persist as you move a motion-path keyframe. The temporal interpolation applied at each keyframe controls the speed of motion along the path.

Auto Bezier interpolation

Auto Bezier interpolation creates a smooth rate of change through a keyframe. You may use Auto Bezier spatial interpolation to create the path of a car turning on a curving road.

As you change an Auto Bezier keyframe value, the positions of Auto Bezier direction handles change automatically to maintain a smooth transition between keyframes. The automatic adjustments change the shape of the value graph or motion path segments on either side of the keyframe. If the previous and next keyframes also use Auto Bezier interpolation, the shape of the segments on the far side of the previous or next keyframes also changes. If you adjust an Auto Bezier direction handle manually, you convert it to a Continuous Bezier keyframe.

Auto Bezier is the default spatial interpolation.

Continuous Bezier interpolation

Like Auto Bezier interpolation, Continuous Bezier interpolation creates a smooth rate of change through a keyframe. However, you set the positions of Continuous Bezier direction handles manually. Adjustments you make change the shape of the value graph or motion path segments on either side of the keyframe.

If you apply Continuous Bezier interpolation to all keyframes of a property, After Effects adjusts the values at each keyframe to create smooth transitions. After Effects maintains these smooth transitions as you move a Continuous Bezier keyframe on either the motion path or the value graph.

Hold interpolation

Hold interpolation is available only as a temporal interpolation method. Use it to change the value of a layer property over time, but without a gradual transition. This method is useful for strobe effects, or when you want layers to appear or disappear suddenly.

If you apply Hold temporal interpolation to all keyframes of a layer property, the value of the first keyframe holds steady until the next keyframe, when the values change immediately. In the value graph, the graph segment following a Hold keyframe appears as a horizontal straight line.

Even though Hold interpolation is available only as a temporal interpolation method, the keyframes on the motion path are visible, but they are not connected by layer-position dots. For example, if you animate the Position property of a layer using Hold interpolation, the layer holds at the position value of the previous keyframe until the current-time indicator reaches the next keyframe, at which point the layer disappears from the old position and appears at the new position.

You can easily freeze the current frame for the duration of the layer using the Freeze Frame command. To freeze a frame, position the current time indicator at the frame you want to freeze. Make sure that the layer is selected and then choose Layer > Time > Freeze Frame. Time-remapping is enabled, and a Hold keyframe is placed at the position of the current time indicator to freeze the frame.

Note:

If you previously enabled time-remapping on the layer, any keyframes you created are deleted when you apply the Freeze Frame command.

You can use Hold interpolation only for outgoing temporal interpolation (for the frames following a keyframe). If you create a keyframe following a Hold keyframe, the new keyframe uses incoming Hold interpolation.

To apply or remove Hold interpolation as outgoing interpolation for a keyframe, select the keyframe in the Timeline panel, and choose Animation > Toggle Hold Keyframe.

Apply and change keyframe interpolation methods

You can apply and change the interpolation method for any keyframe. You can apply changes using the Keyframe Interpolation dialog box, or you can apply them directly to a keyframe in layer bar mode, in a motion path, or in the Graph Editor. You can also change the default interpolation After Effects uses for spatial properties.

For information on using Easy Ease controls to automatically ease speed between keyframes, see Control speed between keyframes.

Change interpolation method with the Keyframe Interpolation dialog box

The Keyframe Interpolation dialog box provides options for setting temporal and spatial interpolation and—for spatial properties only—roving settings.

1. In layer bar mode or in the Graph Editor, select the keyframes you want to change.
2. Choose Animation > Keyframe Interpolation.
3. For Temporal Interpolation, choose one of the following options:

   Current Settings Preserves the interpolation values already applied to the selected keyframes. Choose this option when multiple or manually adjusted keyframes are selected and you do not want to change the existing settings.

   Linear, Bezier, Continuous Bezier, Auto Bezier, and Hold Apply a temporal interpolation method using default values.

4. If you selected keyframes of a spatial layer property, choose one of the following options for Spatial Interpolation:

   Current Settings Preserves the interpolation settings already applied to the selected keyframes.

   Linear, Bezier, Continuous Bezier, and Auto Bezier Apply a spatial interpolation method using default values.

5. If you selected keyframes of a spatial layer property, use the Roving menu to choose how a keyframe determines its position in time, and then click OK:

   Current Settings Preserves the currently applied method of positioning the selected keyframes in time.

   Rove Across Time Smooths the rate of change through the selected keyframes by automatically varying their position in time, based on the positions of the keyframes immediately before and after the selection.

   Lock To Time keeps the selected keyframes at their current position in time. They stay in place unless you move them manually.

   For more information on smoothing the rate of change through selected keyframes, see Create smooth motion with roving keyframes.

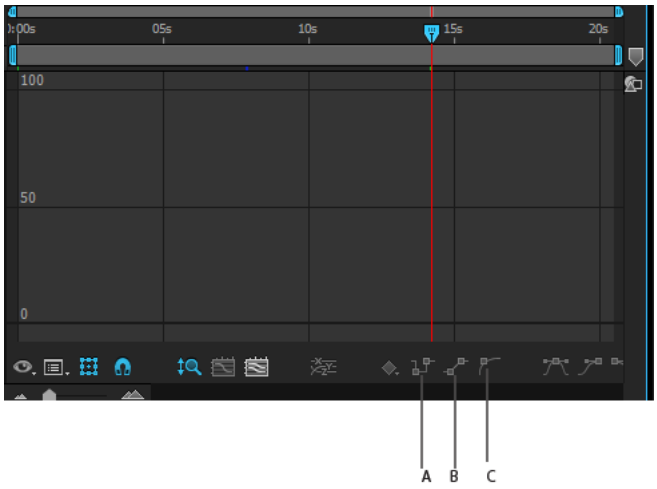
Change interpolation method with the Selection tool in layer bar mode

? Using the Selection tool, do one of the following:

- If the keyframe uses Linear interpolation, Ctrl-click (Windows) or Command-click (Mac OS) the keyframe to change it to Auto Bezier .
- If the keyframe uses Bezier, Continuous Bezier, or Auto Bezier interpolation, Ctrl-click (Windows) or Command-click (Mac OS) the keyframe to change it to Linear.

Change interpolation method in the Graph Editor

- Click the keyframe with the Convert Vertex tool to toggle between linear and Auto Bezier interpolation.
- Select one or more keyframes, and then click the Hold, Linear, or Auto Bezier button at the bottom of the screen to change the interpolation method.



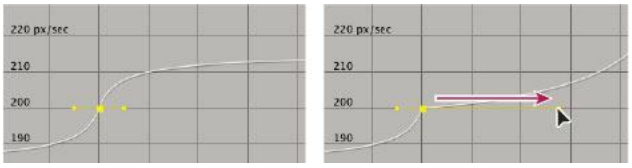
Interpolation buttons in the Graph Editor
***A** Convert selected keyframes to Hold **B** Convert seleced keyframes to Linear **C** Convert selected keyframes to Auto Bezier*

Modify Bezier direction handles in the Graph Editor

In the Graph Editor, keyframes that use Bezier interpolation have direction handles attached to them. You can retract, extend, or rotate the direction handles to fine-tune the Bezier interpolation curve in a value graph. You can retract or extend the direction handles to fine-tune the curve in a speed graph.

By default, when you retract or extend a direction handle, the opposite handle on the keyframe moves with it. Splitting direction handles makes the two direction handles attached to a keyframe behave independently.

- To retract or extend direction handles, drag the direction handle toward or away from the center of its keyframe with the Selection tool.
- To split direction handles, Alt-drag (Windows) or Option-drag (Mac OS) a keyframe with the Selection tool. You can also Alt-drag (Windows) or Option-drag (Mac OS) outside a keyframe to draw new handles, whether or not handles already exist.
- To manipulate the direction handles of two neighboring keyframes simultaneously, drag the value graph segment between the keyframes.



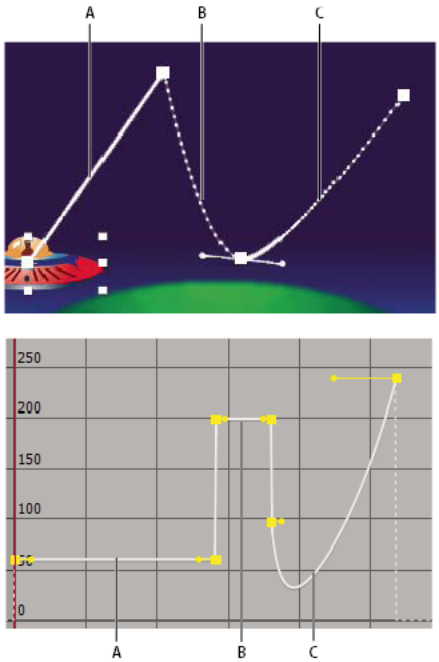
Extending a Bezier direction handle in the speed graph

Speed

Control speed between keyframes

When you animate a property in the Graph Editor, you can view and adjust the rate of change (speed) of the property in the speed graph. You can also adjust speed for spatial properties in the motion path in the Composition or Layer panel.

In the Composition or Layer panel, the spacing between dots in a motion path indicates speed. Each dot represents a frame, based on the frame rate of the composition. Even spacing indicates a constant speed, and wider spacing indicates a higher speed. Keyframes using Hold interpolation display no dots because there is no intermediate transition between keyframe values; the layer simply appears at the position specified by the next keyframe. (See Motion paths.)

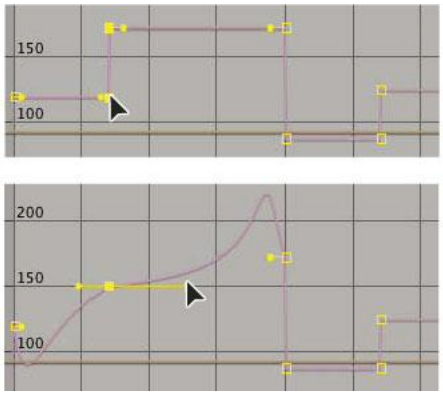


Motion path in Composition panel (top) compared to speed graph in Graph Editor (bottom)
***A** Dots are close together, indicating lower speed (top); speed is constant (bottom). **B** Dots are far apart, indicating greater speed (top); speed is constant (bottom). **C** Inconsistent spacing of dots indicates changing speed (top); speed decreases and then increases (bottom).*

For information about keyframe interpolation, see Keyframe interpolation.

The following factors affect the speed at which a property value changes:

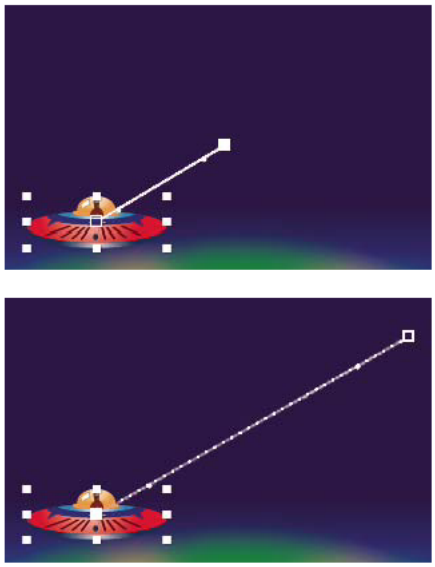
- The time difference between keyframes in the Timeline panel. The shorter the time interval between keyframes, the more quickly the layer has to change to reach the next keyframe value. If the interval is longer, the layer changes more slowly, because it must make the change over a longer period of time. You can adjust the rate of change by moving keyframes forward or backward along the timeline.
- The difference between the values of adjacent keyframes. A large difference between keyframe values, such as the difference between 75% and 20% opacity, creates a faster rate of change than a smaller difference, such as the difference between 30% and 20% opacity. You can adjust the rate of change by increasing or decreasing the value of a layer property at a keyframe.
- The interpolation type applied for a keyframe. For example, it is difficult to make a value change smoothly through a keyframe when the keyframe is set to Linear interpolation, but you can switch to Bezier interpolation at any time, which provides a smooth change through a keyframe. If you use Bezier interpolation, you can adjust the rate of change even more precisely using direction handles.



Linear interpolation (top) causes sharp changes; Bezier interpolation (bottom) creates smoother changes.

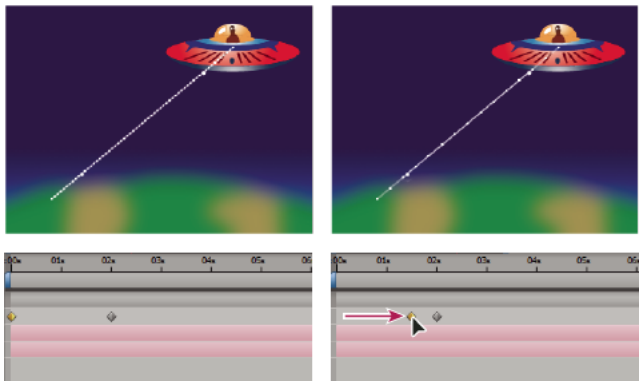
Control speed between keyframes without using the speed graph

- In the Composition or Layer panel, adjust the spatial distance between two keyframes on the motion path. Increase speed by moving one keyframe position farther away from the other, or decrease speed by moving one keyframe position closer to the other.



More spatial distance between keyframes increases layer speed.

- In layer bar mode or in the Graph Editor, adjust the time difference between two keyframes. Decrease speed by moving one keyframe farther away from the other, or increase speed by moving one keyframe closer to the other.



Shorter temporal distance between keyframes increases layer speed.

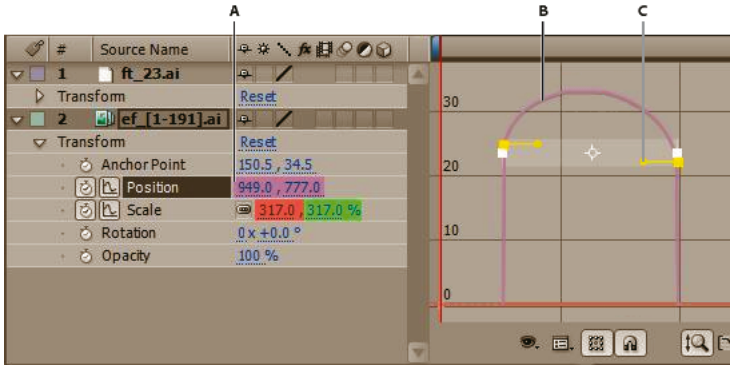
- Apply the Easy Ease keyframe assistant, which automatically adjusts the speed of change as motion advances toward and retreats from a keyframe.

About the speed graph

You can fine-tune changes over time using the speed graph in the Graph Editor. The speed graph provides information about and control of the value and rate of change for all spatial and temporal values at any frame in a composition.

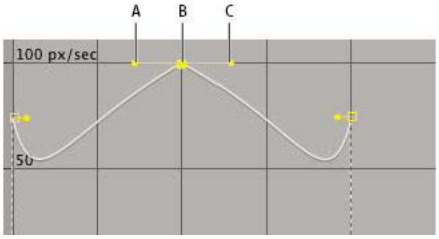
In the speed graph, changes in the graph height indicate changes in speed. Level values indicate constant speed; higher values indicate increased speed.

To view the speed graph, choose Edit Speed Graph from the Choose Graph Type menu .



Speed graph controls
***A** Value at the current-time indicator **B** Speed graph **C** Direction handle (controls speed)*

By adjusting the rise and fall of the speed graph, you can control how quickly or slowly a value changes from keyframe to keyframe. You can control the values approaching and leaving a keyframe together, or you can control each value separately. The incoming handle increases the speed or velocity when you drag it up, and decreases the speed or velocity when you drag it down. The outgoing handle influences the next keyframe in the same way. You can also control the influence on speed by dragging the handles left or right.



Direction handles in speed graphs
***A** Incoming direction handle **B** Speed control **C** Outgoing direction handle*

Note:

If you want a handle to have influence over more than one keyframe, use roving keyframes.

Control speed with the speed graph

1. In the Timeline panel, expand the outline for the keyframe you want to adjust.
2. Click the Graph Editor button and select Edit Speed Graph from the Graph Type And Options menu .
3. Using the Selection tool, click the keyframe you want to adjust.
4. (Optional) Do one of the following:
   - To split the incoming and outgoing direction handles, Alt-drag (Windows) or Option-drag (Mac OS) a direction handle.
   - To join the direction handles, Alt-drag (Windows) or Option-drag (Mac OS) a split direction handle up or down until it meets the other handle.
5. Do any of the following:
   - Drag a keyframe with joined direction handles up to accelerate or down to decelerate entering and leaving the keyframe.
   - Drag a split direction handle up to accelerate or down to decelerate the speed entering or leaving a keyframe.

- To increase the influence of the keyframe, drag the direction handle away from the center of the keyframe. To decrease the influence, drag the direction handle toward the center of the keyframe.

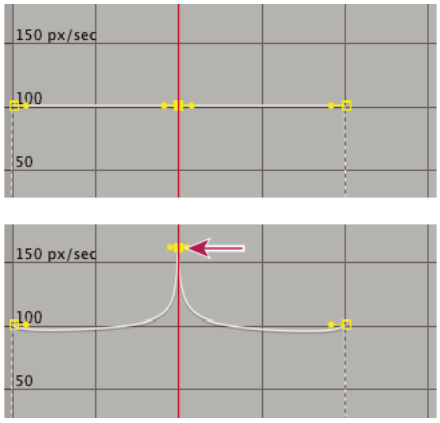
Note:

When you drag a direction handle beyond the top or bottom of the Graph Editor with Auto Zoom Graph Height on, After Effects calculates a new minimum or maximum value based on how far you dragged outside the graph, and it redraws the graph so that all the values you specify for that layer property are visible in the graph by default.

Create a bounce or peak

Use direction handles to simulate the type of acceleration seen in a bouncing ball. When you create this type of result, the speed graph appears to rise quickly and peak.

1. In the Timeline panel, expand the outline for the keyframe you want to adjust.
2. Click the Graph Editor button and display the speed graph for the property.
3. Make sure the interpolation method for the keyframe you want to peak is set to Continuous Bezier or Bezier.
4. Drag the desired keyframe (with joined direction handles) up until it is near the top of the graph.
5. Drag the direction handles on either side of the keyframe toward the center of the keyframe.

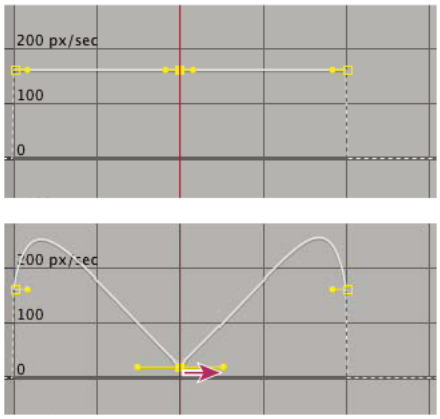


Dragging direction handle to create a peak

Start or stop change gradually

Direction handles can create gradual starts and stops, such as a boat slowing to a stop and then starting again. When you use this technique, the speed graph resembles a smooth U shape.

1. In the Timeline panel, expand the outline for the keyframe you want to adjust.
2. Click the Graph Editor button and display the speed graph for the property.
3. Make sure the interpolation method for the keyframe you want to adjust is set to Continuous Bezier or Bezier.
4. At the desired keyframe, drag the direction handle down until it is near the bottom of the graph.
5. Drag the direction handles on either side of the keyframe away from the center of the keyframe.



Dragging the direction handle to make a gradual change

Adjust influence of a direction handle on an adjacent keyframe

Along with controlling the level of acceleration and deceleration, you can also extend the *influence* of a keyframe outward or inward in relation to an adjacent keyframe. Influence determines how quickly the speed graph reaches the value you set at the keyframe, giving you an additional degree of control over the shape of the graph. The direction handle increases the influence of a keyframe value in relation to the neighboring keyframe when you drag it toward the neighboring keyframe, and it decreases the influence on the neighboring keyframe when you drag it toward the center of its own keyframe.

1. In the Timeline panel, expand the outline for the keyframe you want to adjust.
2. Click the Graph Editor button and display the speed graph for the property.
3. Using the Selection tool, click a keyframe and drag the direction handle left or right.

Change speed numerically

You may want to specify speed more precisely than you can by dragging keyframes in the speed graph. In such cases, specify speed numerically in the Keyframe Velocity dialog box.

The options and units in the dialog box vary depending on the layer property you are editing and may also vary for plug-ins.

1. Display the speed graph for the keyframe you want to adjust.
2. Select the keyframe you want to edit, and then choose Animation > Keyframe Velocity.
3. Enter values for Speed for Incoming and Outgoing Velocity.
4. Enter a value for Influence to specify the amount of influence toward the previous keyframe (for incoming interpolation) or the next keyframe (for outgoing interpolation).
5. To create a smooth transition by maintaining equal incoming and outgoing velocities, select Continuous.

Note:

By default, the proportions of the current Scale or Mask Feather values are preserved as you edit the values. If you don't want to preserve proportions, click the link icon next to the property values in the Timeline panel to remove the icon.

Automatically ease speed

Although you can manually adjust the speed of a keyframe by dragging direction handles, using Easy Ease automates the work.

After you apply Easy Ease, each keyframe has a speed of 0 with an influence of 33.33% on either side. When you ease the speed of an object, for example, the object slows down as it approaches a keyframe, and gradually accelerates as it leaves. You can ease speed when coming into or out of a keyframe, or both.

1 In the Graph Editor or in layer bar mode, select a range of keyframes.

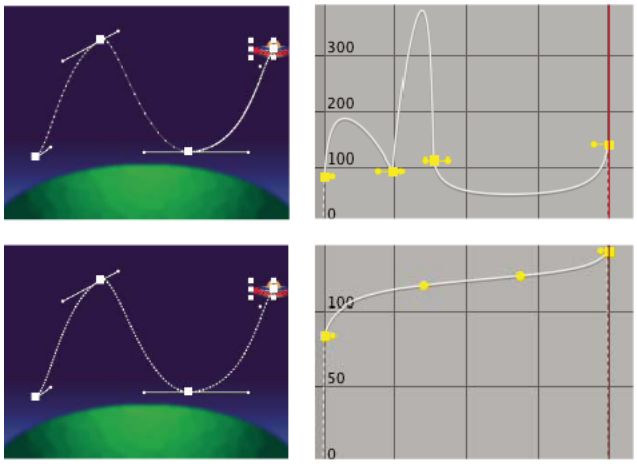
2 Do one of the following:

- Choose Animation > Keyframe Assistant > Easy Ease (to ease speed coming both into and out of selected keyframes), Easy Ease In (to ease speed coming into selected keyframes), or Easy Ease Out (to ease speed coming out of selected keyframes).
- Click the Easy Ease, Easy Ease In, or Easy Ease Out button located at the bottom of the Graph Editor.

Create smooth motion with roving keyframes

Using *roving keyframes*, you can easily create smooth movement across several keyframes at once. Roving keyframes are keyframes that are not linked to a specific time; their speed and timing are determined by adjacent keyframes. When you change the position of a keyframe adjacent to a roving keyframe in a motion path, the timing of the roving keyframe may change.

Roving keyframes are available only for spatial layer properties, such as Position, Anchor Point, and effect control points. In addition, a keyframe can rove only if it is not the first or last keyframe in a layer, because a roving keyframe must interpolate its speed from the previous and next keyframes.



The original motion path (top) shows different velocities between keyframes. After the keyframes are set to rove (bottom), the motion path shows consistent speed over the range of keyframes.

1 In layer bar mode or in the Graph Editor, set up the keyframes for the motion you want to smooth.

2 Determine the beginning and ending keyframes for the range you want to smooth.

3 Do one of the following:

- For every keyframe in the range (except the beginning and ending keyframes), select Rove Across Time in the keyframe menu.
- Select the keyframes you want to rove and choose Animation > Keyframe Interpolation. Then choose Rove Across Time from the Roving menu.

The intermediate keyframes adjust their positions on the timeline to smooth the speed curve between the beginning and ending keyframes.

Revert to a nonroving keyframe

- Select the roving keyframe option from the keyframe menu, or drag the roving keyframe left or right.
- Select the keyframes you want to change, and choose Animation > Keyframe Interpolation. Then choose Lock To Time from the Roving menu.

Use Exponential Scale to change the speed of scaling

You can simulate a realistic acceleration of a zoom lens when working with 2D layers by using Exponential Scale, which converts linear scaling of a layer to exponential scaling. Exponential Scale is useful for creating a cosmic zoom, for example. Zooming optically with a lens is not linear—the rate of change of scaling increases as you zoom in.

1 In layer bar mode or in the Graph Editor, hold down the Shift key and select starting and ending keyframes for the scale property.

2 Choose Animation > Keyframe Assistant > Exponential Scale.

Note:

Exponential Scale replaces any existing keyframes between the selected starting and ending keyframes.

Time-stretching and time-remapping

Time-stretching, time-remapping, and the Timewarp effect are all useful for creating slow motion, fast motion, freeze frame, or other retiming results.

For information on the Timewarp effect, see Timewarp effect.

Time-stretch a layer

Speeding up or slowing down an entire layer by the same factor throughout is known as *time-stretching*. When you time-stretch a layer, the audio and the original frames in the footage (and all keyframes that belong to the layer) are redistributed along the new duration. Use this command only when you want the layer and all layer keyframes to change to the new duration.

If you time-stretch a layer so that the resulting frame rate is very different from the original frame rate, the quality of motion within the layer may suffer. For best results when time-remapping a layer, use the Timewarp effect.

Time-stretch a layer from a specific time

1 In the Timeline or Composition panel, select the layer.

2 Choose Layer > Time > Time Stretch.

3 Type a new duration for the layer, or type a Stretch Factor.

4 To specify the point in time from which the layer will be time-stretched, click one of the Hold In Place options, and then click OK.

Layer In-point Holds the starting time of the layer at its current value and time-stretches the layer by moving its Out point.

Current Frame Holds the layer at the position of the current-time indicator (also the frame displayed in the Composition panel), and time-stretches the layer by moving the In and Out points.

Layer Out-point Holds the ending time of the layer at its current value and time-stretches the layer by moving its In point.

Time-stretch a layer to a specific time

1. In the Timeline panel, move the current-time indicator to the frame where you want the layer to begin or end.
2. Display the In and Out columns by choosing Columns > In and Columns > Out from the Timeline panel menu.
3. Do one of the following:
   - To stretch the In point to the current time, press Ctrl (Windows) or Command (Mac OS) as you click the In time for the layer in the In column.
   - To stretch the Out point to the current time, press Ctrl (Windows) or Command (Mac OS) as you click the Out time for the layer in the Out column.

Time-stretch a layer but not its keyframes

When you time-stretch a layer, the positions of its keyframes stretch with it by default. You can circumvent this behavior by cutting and pasting keyframes.

1. Make a note of the time at which the first keyframe appears. (Placing a composition marker is a good way to mark the time.)
2. In the Timeline panel, click the name of one or more layer properties containing the keyframes you want to keep at the same times.
3. Choose Edit > Cut.
4. Move or stretch the layer to its new In and Out points.
5. Move the current-time indicator to the time at which the first keyframe appeared before you cut the keyframes.
6. Choose Edit > Paste.

Reverse the playback direction of a layer

When you reverse the direction at which a layer plays back, all keyframes for all properties on the selected layer also reverse order. The layer itself maintains its original In and Out points relative to the composition.

Note:

For best results, precompose the layer and then reverse the layer inside the precomposition. For more information on this process, see About precomposing and nesting.

1. In a Timeline panel, select the layer you want to reverse.
2. Choose Layer > Time > Time-Reverse Layer, or press Ctrl+Alt+R (Windows) or Command+Option+R (Mac OS).

Reverse keyframes without reversing layer playback

You can select and reverse keyframes across multiple layers and properties, but each set of keyframes for a property is reversed only within its original time range and not that of any other selected property. Markers in the Timeline panel are not reversed, so you may need to move markers after reversing keyframes.

1. In the Timeline panel, select a range of keyframes you want to reverse.
2. Choose Animation > Keyframe Assistant > Time-Reverse Keyframes.

Time-remapping

Time-remapping overview

You can expand, compress, play backward, or freeze a portion of the duration of a layer using a process known as *time-remapping*. For example, if you are using footage of a person walking, you can play footage of the person moving forward, and then play a few frames backward to make the person retreat, and then play forward again to have the person resume walking. Time-remapping is good for combinations of slow motion, fast motion, and reverse motion.

The Timewarp effect provides similar features with more control over some aspects of frame blending, but with additional limitations as a result of being applied as an effect.

Frames from non-time-remapped footage are displayed at a constant speed in one direction.

Time-remapping distorts time for a range of frames within a layer.

When you apply time-remapping to a layer containing audio and video, the audio and video remain synchronized. You can remap audio files to gradually decrease or increase the pitch, play audio backward, or create a warbled or scratchy sound. Still-image layers cannot be time-remapped.

You can remap time in either the Layer panel or the Graph Editor. Remapping video in one panel displays the results in both. Each provides a different view of the layer duration:

- The Layer panel provides a visual reference of the frames you change, as well as the frame number. The panel displays the current-time indicator and a remap-time marker, which you move to select the frame you want to play at the current time.
- The Graph Editor provides a view of the changes you specify over time by marking your changes with keyframes and a graph like the one displayed for other layer properties.

When remapping time in the Graph Editor, use the values represented in the Time Remap graph to determine and control which frame of the movie plays at which point in time. Each Time Remap keyframe has a time value associated with it that corresponds to a specific frame in the layer; this value is represented vertically on the Time Remap value graph. When you enable time remapping for a layer, After Effects adds a Time Remap keyframe at the start and end points of the layer. These initial Time Remap keyframes have vertical time values equal to their horizontal position on the timeline.

By setting additional Time Remap keyframes, you can create complex motion results. Each time you add a Time Remap keyframe, you create another point at which you can change the speed or direction of playback. As you move the keyframe up or down in the value graph, you adjust which frame of the video is set to play at the current time. After Effects then interpolates intermediate frames and plays the footage forward or backward from that point to the next Time Remap keyframe. In the value graph, reading from left to right, an upward angle indicates forward playback, while a downward angle indicates reverse playback. The amount of the upward or downward angle corresponds to the speed of playback.

Similarly, the value that appears next to the Time Remap property name indicates which frame plays at the current time. As you drag a value graph marker up or down, this value changes accordingly and a Time Remap keyframe is set, if necessary. You can click this value and type a new one, or drag the value to adjust it.

The original duration of the source footage may no longer be valid when remapping time, because parts of the layer no longer play at the original rate. If necessary, set a new duration for the layer before you remap time.

As with other layer properties, you can view the values of the Time Remap graph as either a value graph or a speed graph.

If you remap time and the resulting frame rate is very different from the original, the quality of motion within the layer may suffer. Apply frame blending to improve time remapping for slow motion or fast motion.

Note:

Use the information shown in the Info panel to guide you as you work with time-remapping. The ratio given in the units of seconds/sec indicates the current speed of playback—the number of seconds of the original layer being played for each second after time-remapping.

Time-remap a layer

You can time-remap all or part of a layer to create many different results, such as freeze-frame or slow-motion results. (See Time-remapping.)

Freeze the current frame for the duration of the layer

1. In a Composition or Timeline panel, select the layer.
2. Place the current-time indicator on the frame that you want to freeze.
3. Choose Layer > Time > Freeze Frame.

Time-remapping is enabled, and After Effects places a Hold keyframe is at the position of the current-time indicator to freeze the frame. If you previously enabled time-remapping on the layer, any keyframes you created are deleted when you apply the Freeze Frame command.

Freeze the first frame without changing the speed

1. In a Composition or Timeline panel, select the layer that you want to remap.
2. Choose Layer > Time > Enable Time Remapping.

   This command adds two Time Remap keyframes by default, one at the beginning of the layer and one at the end.

3 Move the current-time indicator to where you want the movie to begin.

4 Click the Time Remap property name to select the start and end keyframes.

5 Drag the first keyframe to the current-time indicator, which moves the start and end keyframes. (If you are working in the Graph Editor, drag the bounding box—not the keyframe or a handle—so that both keyframes move.)

Freeze a frame in the middle of the duration of a layer

1 In a Composition or Timeline panel, select the layer that you want to remap.

2 Choose Layer > Time > Enable Time Remapping.

This command adds two Time Remap keyframes by default, one at the beginning of the layer and one at the end.

3 Move the current-time indicator to the frame that you want to freeze, and set a Time Remap keyframe at the current time by clicking the keyframe navigator diamond for the Time Remap property.

4 Select the last two Time Remap keyframes (the second and third keyframes) and drag them to the right.

5 Press F2 to deselect the keyframes, and then click the second (middle) keyframe to select it.

6 Press Ctrl+C (Windows) or Command+C (Mac OS) to copy the keyframe.

7 Press Ctrl+V (Windows) or Command+V (Mac OS) to paste the keyframe at the current time. You should not have moved the current-time indicator since step 3.

8 (Optional) To extend the layer so that its duration is increased to accommodate the time added by the freeze-frame operation, press the K key twice to move the current-time indicator to the last Time Remap keyframe, and press Alt+] (Windows) or Option+] (Mac OS).

The portion of the layer between the first and second keyframes plays at an unaltered rate (the same as for the non-time-remapped layer), as does the portion of the layer between the third and fourth keyframes. The second and third keyframes are identical, so a single frozen frame plays during the time between those two keyframes.

Remap time using the Graph Editor

To switch between Graph Editor mode and layer bar mode, press Shift+F3.

1 In a Composition or Timeline panel, select the layer you want to remap.

2 Choose Layer > Time > Enable Time Remapping.

3 In the Timeline panel, click the name of the Time Remap property to select it.

4 Move the current-time indicator to the time at which to add a keyframe, and click the keyframe button in the keyframe navigator to add a keyframe.

5 In the Graph Editor, drag the keyframe marker up or down, watching the Time Remap value as you drag. To snap to other keyframes, Shift-drag.

- To slow the layer down, drag the keyframe down. (If the layer is playing in reverse, drag up.)
- To speed the layer up, drag the keyframe up. (If the layer is playing in reverse, drag down.)
- To play frames backward, drag the keyframe down to a value below the previous keyframe value.
- To play frames forward, drag the keyframe up to a value above the previous keyframe value.
- To freeze the previous keyframe, drag the current keyframe marker to a value equal to the previous keyframe value so that the graph line is flat. Another method is to select the keyframe and choose Animation > Toggle Hold Keyframe, and then add another keyframe where you want the motion to start again.

Before you move a time-remap keyframe, it's a good idea to select all subsequent time-remap keyframes in the layer first. This selection will preserve the timing of the rest of the layer when you remap time for the current keyframe.

Remap time in a Layer panel

1. Open the Layer panel for the layer you want to remap.
2. Choose Layer > Time > Enable Time Remapping. A second time ruler appears in the Layer panel above the default time ruler and the navigator bar.
3. On the lower time ruler, move the current-time indicator to the first frame where you want the change to occur.
4. On the upper time ruler, the remap-time marker indicates the frame currently mapped to the time indicated on the lower time ruler. To display a different frame at the time indicated on the lower time ruler, move the remap-time marker accordingly.
5. Move the current-time indicator on the lower time ruler to the last frame where you want change to occur.
6. Move the remap-time marker on the upper time ruler to the frame you want to display at the time indicated on the lower time ruler:
   - To move the preceding portion of the layer forward, set the remap-time marker to a later time than the current-time indicator.
   - To move the preceding portion of the layer backward, set the remap-time marker to an earlier time than the current-time indicator.
   - To freeze a frame, set the remap-time marker to the frame you want frozen. Then, move the current-time indicator (lower ruler) to the last point in time where the frame will appear frozen and move the remap-time marker again to the frame you want frozen.

Time-remap audio pitch

The speed graph of the Time Remap property directly relates to the pitch of an audio file. By making subtle changes to the speed graph, you can create a variety of interesting effects. To avoid screeching audio, you may want to keep the Speed value below 200%. When the speed is too high, use the Levels controls, located under the Audio property, to control the volume.

You may hear clicks at the beginning and end of an audio (or an audio and video) layer after setting new In and Out points in the Time Remap graph. Use the Levels controls to remove these clicks.

Change the pitch of an audio layer

1. In a Composition or Timeline panel, select the layer you want to remap.
2. Choose Layer > Time > Enable Time Remapping.
3. Click the Graph Editor button in the Timeline panel to display the Graph Editor, if necessary.
4. Click the Choose Graph Type And Options button at the bottom of the Graph Editor and choose Edit Speed Graph.
5. Move the current-time indicator to the frame where you want change to begin, and then click the Add A Keyframe button.
6. On the speed graph below the keyframe, drag a marker, watching the Speed value as you drag.
   - To lower the pitch, drag the speed graph marker down.
   - To increase the pitch, drag the speed graph marker up.

Remove clicks from new In and Out points

1. If necessary, choose Panel > Audio.
2. In the Timeline panel, select the audio (or audio and video) layer to which you applied time-remapping.
3. Expand the layer outline to display the Audio property and then the Audio Levels property.
4. Move the current-time indicator to the new In point and choose Animation > Add Audio Levels Keyframe.
5. In the Audio panel, change the decibel value to 0.0.
6. Press the Page Up key on your keyboard to move the current-time indicator to the previous frame.
7. In the Audio panel, change the decibel level to -96.0.
8. Move the current time to the new Out point and set the decibel level to 0.
9. Press the Page Down key to move the current-time indicator to the next frame.
10. In the Audio panel, change the decibel level to -96.0.

You can change the decibel Slider Minimum value in the Audio Options dialog box, which is available from the Audio panel menu.

Recommended resources for time-remapping

Aharon Rabinowitz provides a tutorial on the Creative COW website that shows how to use time-remapping to do lip-synching. This same basic concept can be used for many kinds of character animation.

Robert Powers provides a video tutorial on the Slippery Rock NYC website that demonstrates how to use time-remapping to animate a character to synchronize mouth movement with audio (lip synch).

Andrew Kramer provides a video tutorial on his Video Copilot website that demonstrates time-stretching, time-remapping, and frame blending.

Frame blending

When you time-stretch or time-remap a layer to a slower frame rate or to a rate lower than the frame rate of its composition, movement can appear jerky. This jerky appearance results because the layer now has fewer frames per second than the composition. Likewise, the same jerky appearance can occur when you time-stretch or time-remap a layer to a frame rate that is faster than the frame rate of its composition. To create smoother motion when you slow down or speed up a layer, use frame blending. Don't apply frame blending unless the video of a layer has been re-timed—that is, the video is playing at a different frame rate than the frame rate of the source video.

After Effects provides two types of frame blending: Frame Mix and Pixel Motion. Frame Mix takes less time to render, but Pixel Motion provides much better results, especially for footage that has been drastically slowed down.

The Quality setting you select also affects frame blending. When the layer is set to Best quality, frame blending results in smoother motion but may take longer to render than when set to Draft quality.

Note:

When working with a frame-blended layer in Draft mode, After Effects always uses Frame Mix interpolation to increase rendering speed.

You can also enable frame blending for all compositions when you render a movie.

Use frame blending to enhance the quality of time-altered motion in a layer that contains live-action footage—video, for example. You can apply frame blending to a sequence of still images, but not to a single still image. If you are animating a layer—for example, moving a text layer across the screen—use motion blur.

Note:

You can't apply frame blending to a precomposition layer (a layer that uses a nested composition as its source footage item). You can, however, apply frame blending to the layers within the nested composition if those layers themselves are based on motion footage items, such as video or image sequences.

1 Select the layer in the Timeline panel.

2 Do one of the following:

- Choose Layer > Frame Blending > Frame Mix.
- Choose Layer > Frame Blending > Pixel Motion.

A check mark adjacent to the appropriate Frame Blending command (Frame Mix or Pixel Motion) indicates that it is applied to the selected layer. Also, the Frame Blending switch appears in the Switches column for the layer in the Timeline panel. Remove frame blending either by clicking the Frame Blending switch or by choosing the appropriate Frame Blending command again.

Regardless of the state of the layer switches, if frame blending is off for the composition, it is off for all layers in the composition. Set frame blending for the composition by choosing Enable Frame Blending from the Timeline panel menu, or by clicking the Enable Frame Blending button at the top of the Timeline panel.

Motion blur can make it harder for Pixel Motion to find discrete objects in each frame, which makes the calculation of motion vectors less reliable. For better results when using Pixel Motion to create slow motion, use footage with less motion blur.

Tracking 3D camera movement

3D camera tracker effect

The 3D camera tracker effect analyzes video sequences to extract camera motion and 3D scene data. The 3D camera motion allows you to correctly composite 3D elements over your 2D footage.

Like the Warp Stabilizer, the 3D camera tracker effect performs analysis using a background process. Feel free to adjust settings or work on a different part of your project while analysis is taking place.

Analyzing footage and extracting camera motion

1 With a footage layer selected, do one of the following:

1 Choose **Animation** > **Track Camera**, or choose Track Camera from the layer context menu.

2 Choose **Effect** > **Perspective** > **3D Camera Tracker**.

3 In the Tracker panel, click the **Track Camera** button. The 3D Camera Tracker effect is applied. The analysis and solving phases occur in the background, with status appearing as a banner on the footage and next to the Cancel button.

4 Adjust the settings, as needed.

The 3D solved track points appears as small colored x's. You can use these track points to place content into the scene.

You can select more than one layer at a time for camera tracking using the 3D camera tracker effect.

Attaching content into a scene containing a solved camera

1 With the effect selected, select the track point or multiple track points (defining a best-fit plane) to use as the attach point.

   1 Hover between three neighboring unselected track points that can define a plane, a semitransparent triangle appears between the points. A red target appears, showing the orientation of the plane in 3D space.

   2 Draw a marquee-selection box around multiple track points to select them.

3 Right-click above the selection or target, and then choose the type of content to create. The following types can be created:

   - Text
   - Solid
   - Null layer for the center of the target
   - Text, solid, or null layer for each selected point
   - "Shadow catcher" layer (a solid that accepts shadows only) for the created content by using the Create Shadow Catcher command in the context menu.

Note:

A shadow catcher layer also creates a light if one does not exist.

If creating multiple layers, each one has a unique numbered name. If creating multiple text layers, In and Out points are trimmed to match the point durations.

Moving the target to attach content to different location

To move the target so that you can attach content to a different location, do the following:

1 When above the center of the target, the "move" cursor appears for repositioning the target.

2 Drag the center of the target to desired location.

Once at the intended location, you can attach content by using the commands in the context menu.

If the size of the targets is too small or too large to see, you can resize them to help visualize the planes. The target size also controls the default size of text and solid layers created using the context menu commands.

Resizing a target

To resize a target, do one of the following:

- Adjust the **Target Size** property.
- Press Alt-click (Windows) or Option-click (Mac OS) as you drag from the center of the target. When above the center of the target, a cursor with horizontal arrows allows you to resize the target.

Selecting and deselecting track points

To select track points, do one of the following:

- Click a track point.
- Click between three adjacent track points.
- Draw a marquee-selection box around multiple points.
- Shift-click or draw a Shift-marquee selection box around the track points to add multiple track points to the current selection.

To deselect track points, do one of the following:

- Alt-click (Windows) or Option-click (Mac OS) selected track points.
- Click away from a track point.

Moving objects can confuse the 3D camera tracker effect. It can interpret points for stationary objects close to the camera as moving due to parallax. To help solve the camera, delete bad or unwanted points.

Deleting unwanted track points

To delete unwanted track points, do the following:

1. Select the track points.
2. Press Delete or choose **Delete Selected Points** from the context menu.

After deleting unwanted track points, the camera is resolved. You can delete additional points while resolving takes place in the background. Deleting 3D points deletes the corresponding 2D points, as well.

Creating a "shadow catcher" layer

You can quickly create a "shadow catcher" layer, used to create realistic shadows for the effect. A shadow catcher layer is white solid the same size as the footage, but set to accept shadows only.

To create a shadow catcher layer, use the **Create Shadow Catcher, Camera and Light** commands in the context menu.

If necessary, adjust the position and scale of the shadow catcher layer so the cast shadow appears as desired. This command also creates a shadow-casting light (a light that is switched on, and casts shadows) if one does not exist in the composition.

Effect controls for the 3D camera tracker

The effect has the following controls and settings:

Analyze/Cancel Starts or stops the background analysis of the footage. During analysis, status appears as a banner on the footage and next to the Cancel button.

Shot Type Specifies whether the footage was captured with a fixed horizontal angle of view, variable zoom, or a specific horizontal angle of view. Changing this setting requires a resolve.

Horizontal Angle of View Specifies the horizontal angle of view the solver uses. Enabled only when **Shot Type** is set to **Specify Angle of View**.

Show Track Points Identifies detected features as 3D points with perspective hinting (3D Solved) or 2D points captured by the feature track (2D Source).

Render Track Points Controls if the track points are rendered as part of the effect.

Note:

*When the effect is selected, track points are always shown, even if **Render Track Points** is not selected. When enabled, the points are displayed into the image allowing them to be seen during preview.*

Track Point Size Changes the displayed size of the track points.

Create Camera Creates the 3D camera. A camera is automatically added when you create a text, solid, or null layer from the context menu.

Advanced controls Advanced controls for the 3D camera tracker effect:

- **Solve Method:** Provides hints about the scene to help in solving the camera. Solve the camera by trying the following:
  - **Auto Detect:** Automatically detects the scene type.
  - **Typical:** Specifies the scene as that which are not purely rotational, or mostly flat.
  - **Mostly Flat Scene:** Specifies the scene as mostly flat, or planar.
  - **Tripod Pan:** Specifies the scene as purely rotational.
- **Method Used:** When **Solve Method** is set to **Auto Detect**, this displays the actual solve method used.
- **Average Error:** Displays the average distance (in pixels) between the original 2D source points and a reprojection of the 3D solved points onto the 2D plane of the source footage. If a track/solve was perfect, this error would be 0 and there would be no visible difference if you toggled between 2D Source and 3D Solved track points. You can use this value to tell if deleting points, changing the solve method, or making other changes is lowering this value, and thus improving the track.
- **Detailed Analysis:** When checked, makes the next analysis phase do extra work to find elements to track. The resulting data (stored in the project as part of the effect) is much larger and slower with this option enabled.
- **Auto-delete Points Across Time**: With the new **Auto-delete Track Points Across Time** option, when you delete track points in the **Composition** panel, corresponding track points (i.e., track points on the same feature/object) are deleted at other times on the layer. You don't need to delete the track points frame by frame to improve the quality of the track. For example, you can delete track points on a person running through the scene, whose motion should not be considered for the determination of how the camera was moving in the shot.
- **Hide Warning Banner:** Use when you don't want to reanalyze footage even though there is a warning banner indicating that it be reanalyzed.

Ground plane and origin in 3D Camera Tracker effect

You can define a ground plane (reference plane) and origin, for example, the (0,0,0) point of the coordinate system within the **3D Camera Tracker** effect.

1 Analyze the scene using the **3D Camera Tracker** effect

2 Select a set of tracking points. This action causes the bullseye target to appear, showing the plane defined by the selected tracking points.

3 Optionally drag the target by its center to reposition it along the plane, and place the center is where you want the origin to be.

4 Right-click (Windows) or Control-click (Mac OS) the target and choose **Set Ground Plane And Origin**.

This action does not have any visible result, but the reference plane and origin of the coordinate system are saved for this scene. Any items that you create from within this instance of the **3D Camera Tracker** effect are created using this plane and origin.

Note:

*If you choose **Set Ground Plane And Origin** again, a warning tells you that objects already created using a different ground plane and origin are not to be updated using the new ground plane and origin.*

Auto-delete Points Across Time

In the **Advanced** section of the effect properties, there is a new option: **Auto-delete Points Across Time**.

If this option is on, when you delete track points in the **Composition** panel, corresponding track points (for example, track points on the same feature or object) are deleted at other times on the layer, so it isn't necessary to delete the track points frame by frame to improve the quality of the track. For example, you can delete track points on a person running through the scene, whose motion should not be considered for the determination of how the camera was moving in the shot. This method works for both 2D Source and 3D Solved track points.

You can delete selected track points with the Delete key or by context-clicking and choosing **Delete Selected Points**.

Note:

*Even with the new **Auto-delete Points Across Time** feature, you can instead or additionally define an alpha channel for the layer to prevent the **3D Camera Tracker** effect from considering a specific part of the image for determining a camera.*

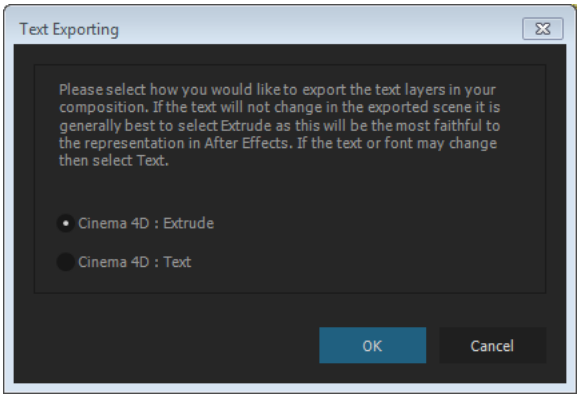
Export 3D Camera Tracker data to 3D applications

You can export 3D Camera Tracker data to 3D applications like MAXON CINEMA 4D.

Do the following:

1 Choose **File** > **Export** > **MAXON Cinema 4D Exporter**.

2 In the **Text Exporting** dialog box that opens, choose the Extrude or Text option.


Text Exporting
Please select how you would like to export the text layers in your composition. If the text will not change in the exported scene it is generally best to select Extrude as this will be the most faithful to the representation in After Effects. If the text or font may change then select Text.
Cinema 4D : Extrude
Cinema 4D : Text
OK
Cancel

Exporting to MAXON Cinema 4D Exporter

3 Name the file and click Save.

4 Open the file in the 3D application.

Face Tracking

Face Tracking Overview

Face Tracking lets you accurately detect and track human faces. Simple mask tracking lets you quickly apply effects only to a face, such as selective color correction or blurring a person's face, and more.

However, with Face Tracking, you can track specific parts of the face such as pupils, mouth, and nose, allowing you to isolate and work on these facial features with greater detail. For example, change colors of the eyes or exaggerate mouth movements without frame-by-frame adjustments.

After Effects also lets you measure facial features. Tracking of facial measurements tells you details such as how open the mouth or an eye is. With each data point isolated, you could greatly refine content. Furthermore, you can also export detailed tracking data to Adobe Character Animator for performance-based character animation.

The face tracker works largely automatically, but you can obtain better results by starting the analysis on a frame showing a front, upright view of the face. Adequate lighting on the face can improve the accuracy of face detection.

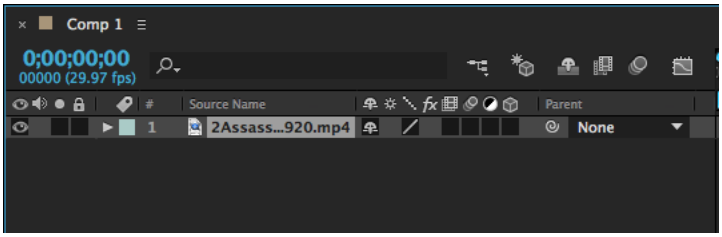
In the Tracker panel, there are two face-tracking options:

- **Face Tracking (Outline Only)**: Use this option if all you want to track is the outline of the face.
- **Face Tracking (Detailed Features)**: Use this option if you want to detect eye (including eyebrow and pupil), nose, and mouth locations, and optionally, extract measurements of various features. This option is required if you want to use the tracking data in Character Animator.

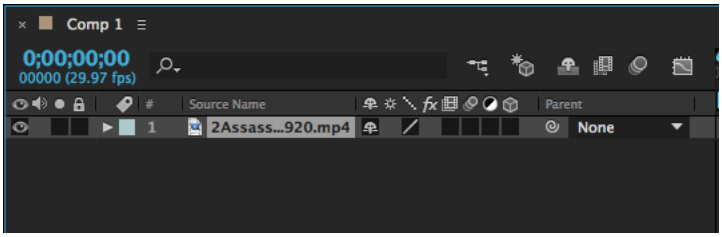
  If you are using the Detailed Features option, a Face Track Points effect is applied to the layer. The effect contains several 2D effect control points with keyframes, each of which is attached to detected facial features (for example, the corners of the eyes and mouth, locations of pupils, the tip of the nose).

Tracking outline of a face

1 In After Effects, select **File** > **Import** > **File**. Browse to the location of the footage, and add it to the Project.



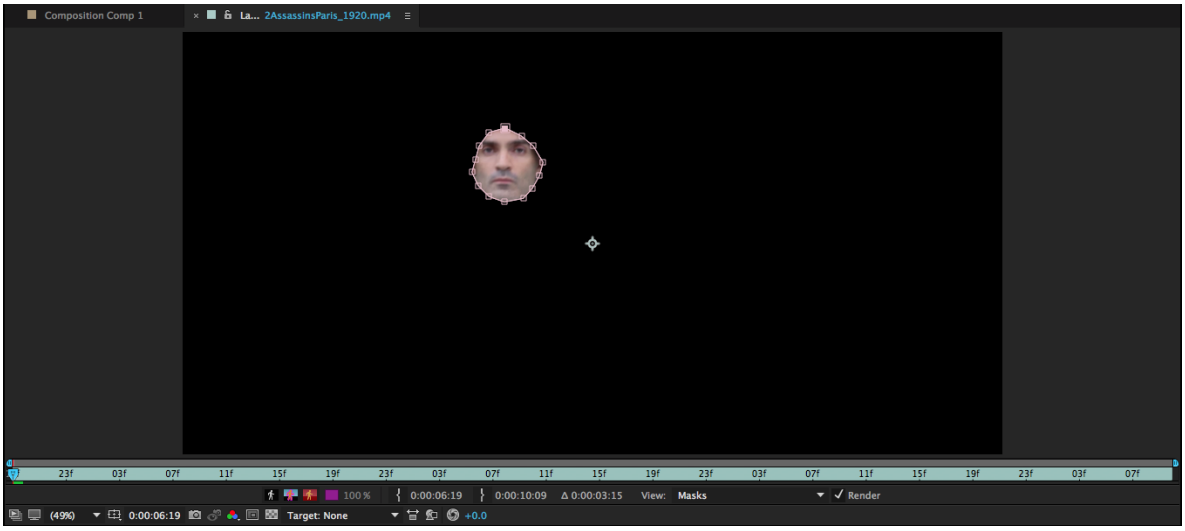
2 Drag the footage from the Project panel into a Composition to add a layer.



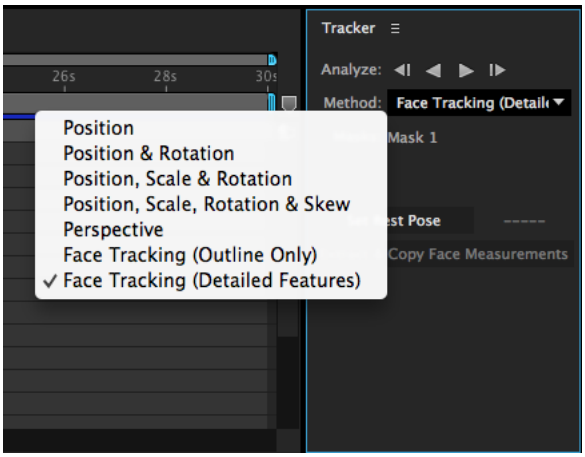
3 Position the current time indicator (CTI) to a frame showing a front, upright view of the face you want to track.

Face detection is improved if the initial frame to track has a face looking forward and is oriented upright.

4 Draw a closed mask loosely around the face, enclosing the eyes and mouth. The mask defines the search region to locate facial features. If multiple masks are selected, the topmost mask is used.

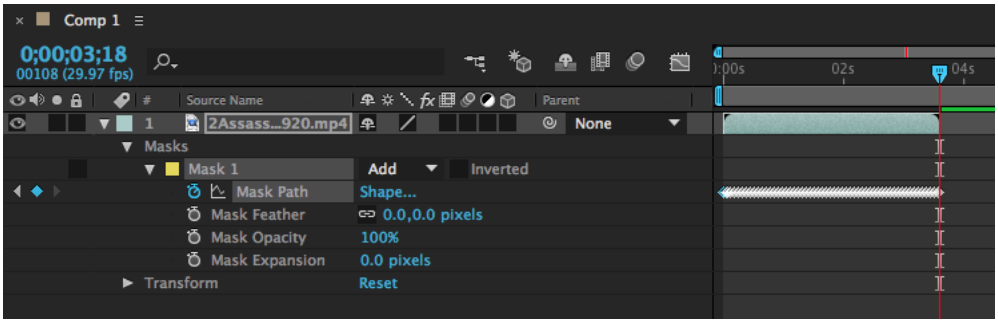


5 With the Mask selected, select **Window** > **Tracker**to open the Tracker panel. Set the tracking Method to **Face Tracking (Outline Only)**.



6 In the Tracker panel, track forward or backward one frame at a time to ensure that tracking is functioning correctly, and then, click the ▶ button to begin analyzing all frames.

7 Once the analysis is complete, face tracking data is made available within the composition.



Tracking detailed features and extracting facial measurements

1 In After Effects, select **File** > **Import** > **File**. Browse to the location of the footage, and add it to the Project.

2 Drag the footage from the Project panel into a Composition to add a layer.

3 Position the Current Time Indicator to a frame showing a front, upright view of the face you want to track.

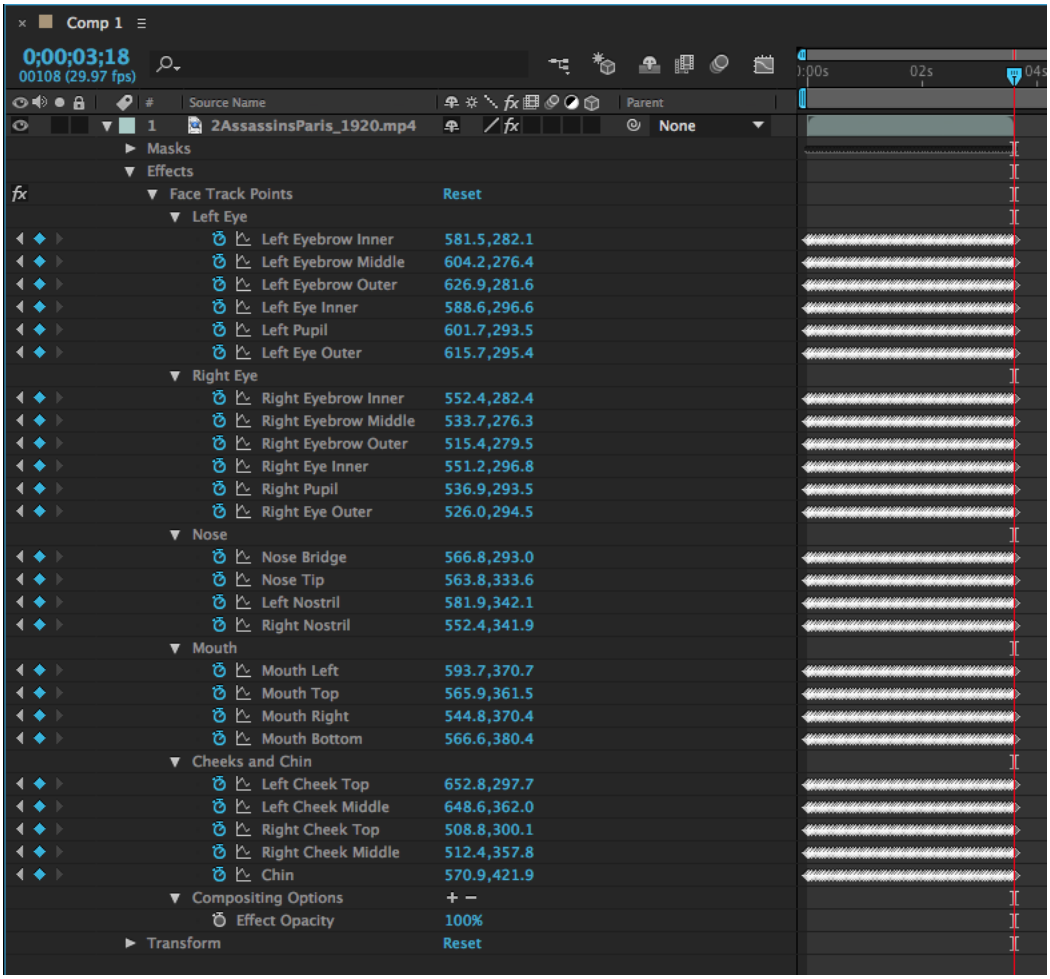
Face detection is improved if the initial frame to track has a face looking forward and is oriented upright.

4 Draw a closed mask loosely around the face, enclosing the eyes and mouth. The mask defines the search region to locate facial features. If multiple masks are selected, the topmost mask is used.

5 With the Mask selected, select **Window** > **Tracker**to open the Tracker panel. Set the tracking Method to **Face Tracking (Detailed Features).**

6 In the Tracker panel, track forward or backward one frame at a time to ensure that tracking is functioning correctly, and then, click the ▶ button to begin analyzing all frames.

7 After the analysis is complete, the tracking data is made available within a new Effect called **Face Track Points**. You can choose to access face tracking data within the composition or the Effects (**Window** > **Effect Controls**) panel.

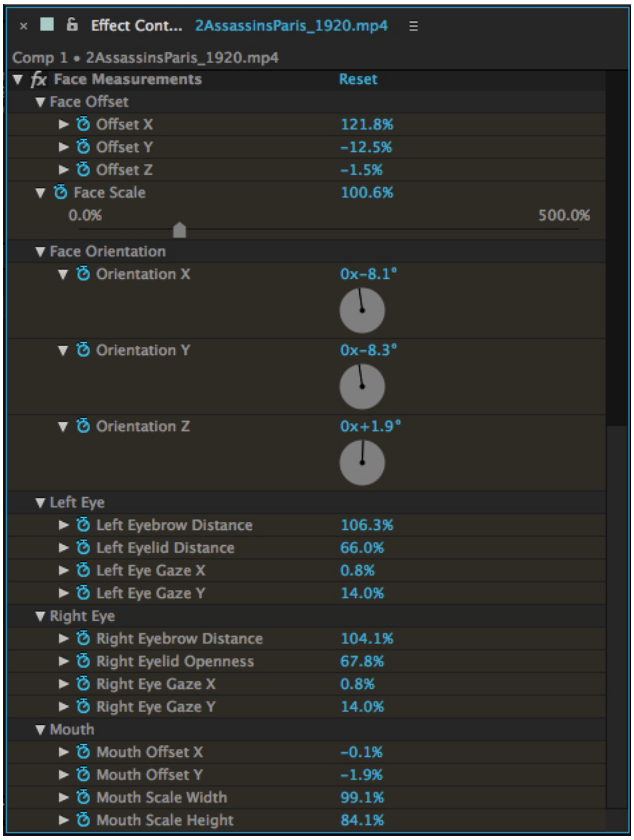


8 Move the current-time indicator to a frame showing a neutral expression on the face (the rest pose). Face measurements on other frames are relative to the rest pose frame. In the Tracker panel, click **Set Rest Pose**.

9 In the Tracker Panel, click **Extract & Copy Face Measurements**. A Face Measurements effect is added to the layer, and keyframes are created based on calculations made from the Face Track Points keyframe data. The Face Measurements keyframe data is copied to the system clipboard for use in Character Animator.

Note:

The keyframes for Face Measurements are generated based on the Face Track Points keyframe data, relative to the Rest Pose (refer to Step 8).



Face tracking data reference

Face Track Points

The Face Tracker effect creates effect control points for several facial features, which you can view in the Timeline panel.

Face Measurements

If you have used the Detailed Features option, you can extract even more information in the form of parametric measurements of facial features, known as Face Measurements. All measurements shown for the face you tracked are relative to the Rest Pose frame.

Face Offset Indicates the position of the face, offsetting to 0% at Rest Pose frame. The following data points are made available indicating offset values on x, y, and z axes:

- Offset X
- Offset Y
- Offset Z

Face Orientation Indicates three-dimensional orientations of the face. Orientation is measured using the following data points, indicative of x, y, and z axes:

- Orientation X

- Orientation Y
- Orientation Z

Left Eye Indicates various points of measurement for the left eye, and includes the following data points:

- Left Eyebrow Distance
- Left Eyelid Openness
- Left Eye Gaze X
- Left Eye Gaze Y

Right Eye Indicates various points of measurement for the right eye, and includes the following data points:

- Right Eyebrow Distance
- Right Eyelid Openness
- Right Eye Gaze X
- Right Eye Gaze Y

Mouth Indicates various points of measurement for the mouth, and includes the following data points:

- Mouth Offset X
- Mouth Offset Y
- Mouth Scale Width
- Mouth Scale Height

Tracking and stabilizing motion

Motion tracking overview and resources

With motion tracking, you can track the movement of an object and then apply the tracking data for that movement to another object—such as another layer or an effect control point—to create compositions in which images and effects follow the motion. You can also stabilize motion, in which case the tracking data is used to animate the tracked layer to compensate for movement of an object in that layer. You can link properties to tracking data using expressions, which opens up a wide variety of uses.

After Effects tracks motion by matching image data from a selected area in a frame to image data in each succeeding frame. You can apply the same tracking data to different layers or effects. You can also track multiple objects in the same layer.

Note:

In After Effects, you can track camera motion and place 3D objects in 2D footage much more easily using the 3D camera tracker. For more information, see Tracking 3D camera movement.

Note:

You can stabilize shaky footage a lot easier using the Warp Stabilizer. For more information, see Work with the Mocha AE CC plug-in.

Uses for motion tracking and stabilization

Motion tracking has many uses. Here are some examples:

- Combining elements filmed separately, such as adding video to the side of a moving city bus or a star to the end of a sweeping wand.
- Animating a still image to match the motion of action footage, such as making a cartoon bumblebee sit on a swaying flower.
- Animating effects to follow a moving element, such as making a moving ball glow.
- Linking the position of a tracked object to other properties, such as making stereo audio pan from left to right as a car races across the screen.
- Stabilizing footage to hold a moving object stationary in the frame to examine how a moving object changes over time, which can be useful in scientific imaging work.
- Stabilizing footage to remove the jostling (camera shake) of a handheld camera.

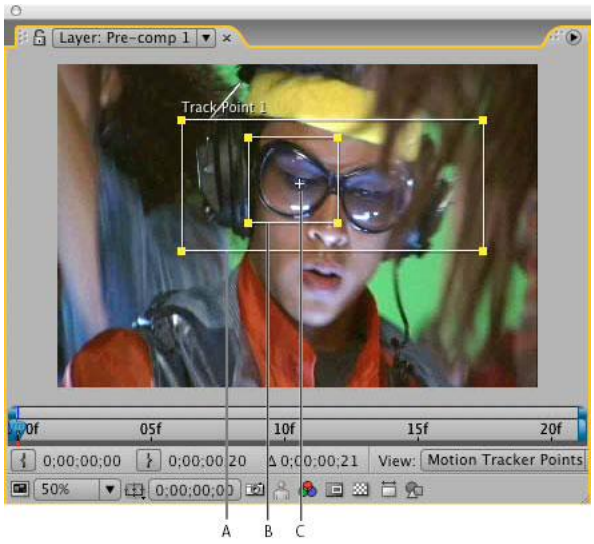
Depending on the encoder you use, it is possible to decrease the size of your final output file by stabilizing motion footage. Random motion, such as from the jostling of a handheld camera, can make it difficult for many compression algorithms to compress your video.

Motion tracking user interface and terminology overview

You set up, initiate, and apply motion tracking with the Tracker panel.

As with all properties, you can modify, animate, manage, and link tracking properties in the Timeline panel.

You specify areas to track by setting *track points* in the Layer panel. Each track point contains a *feature region*, a *search region*, and an *attach point*. A set of track points is a *tracker*.



Layer panel with track point
***A** Search region **B** Feature region **C** Attach point*

Feature region The feature region defines the element in the layer to be tracked. The feature region should surround a distinct visual element, preferably one object in the real world. After Effects must be able to clearly identify the tracked feature throughout the duration of the track, despite changes in light, background, and angle.

Search region The search region defines the area that After Effects will search to locate the tracked feature. The tracked feature needs to be distinct only within the search region, not within the entire frame. Confining the search to a small search region saves search time and makes the search process easier, but runs the risk of the tracked feature leaving the search region entirely between frames.

Attach point The attach point designates the place of attachment for the *target* —the layer or effect control point to synchronize with the moving feature in the tracked layer.

Note:

When you begin tracking, After Effects sets the quality of the motion source layer to Best and the resolution to Full in the Composition and Layer panels, which makes the tracked feature easier to find and enables subpixel processing and positioning.

After Effects uses one track point to track position, two track points to track scale and rotation, and four points to perform tracking using corner pinning.

Online resources for motion tracking and stabilization

Curtis Sponsler provides detailed instructions and explanations for tracking and stabilizing motion in a PDF excerpt from his book The Focal Easy Guide to After Effects.

Chris and Trish Meyer provide a video tutorial on the ProVideo Coalition website that demonstrates and explains the basics of motion tracking.

This video from the After Effects CS5: Learn By Video series shows how to combine motion tracking and the Clone Stamp tool to remove an object from a scene.

Angie Taylor provides a tutorial on the Digital Arts website that shows how to use tracking data and the Clone Stamp tool to apply copies of an object in a scene while matching a camera move.

Eran Stern provides a video tutorial on the Artbeats website that demonstrates the use of 3D tracking software that solves for camera movement so that additional elements can be composited into the scene and appear to honor the same camera movement. This video tutorial uses Pixel Farm PFHoe, but the techniques can be applied to almost any matchmoving software.

This post on the AE Enhancers forum describes and links to an animation preset from Donat van Bellinghen for scaling a set of Corner Pin effect points.

This post on the AE Enhancers forum describes and links to a script from Paul Tuersley that takes a stabilized layer, precomposes it, and then adds expressions that counter the stabilization.

This post on the AE Enhancers forum describes and links to a script from Paul Tuersley that can make a difficult tracking job easier by averaging multiple sets of tracking data.

Jeff Almasol provides a script on his redefinery website that creates a null layer with an expression that sets the Position property to be the average of the values of motion tracking track points for the selected layer.

Jörgen Persson provides a script on the After Effects Scripts website with which you can import tracking data from Apple Shake into After Effects.

Mathias Möhl provides useful scripts for motion tracking—including MochaImport, KeyTweak, and Tracker2Mask—on his website. Mathias also provides video tutorials explaining the use of the scripts.

Work with the Mocha AE CC plug-in

After Effects includes the Mocha AE CC plug-in from Imagineer Systems - Boris FX. This replaces the standalone Mocha AE application. The Mocha AE CC plug-in includes the same accurate planar tracking as the standalone Mocha AE application, but features a different interface and is GPU-accelerated.

The Mocha AE CC plug-in is based on the Mocha Pro 2019 plug-in for After Effects and Premiere Pro which adds tools and workflows such as:

- Automatic object removal with the Remove Module
- Lens calibration with the Lens Module
- Insert Module with Mesh Warper
- 3D camera solver

To use Mocha AE CC, select a footage layer in your composition and select **Effect > Mocha > Mocha AE CC**. To open the full Mocha tracking interface, click the Mocha logo in the **Effect Controls** panel.

Changes in the Mocha AE CC plug-in functionality

- The Mocha interface launches inside of After Effects instead of as a separate application, and you can apply the the plug-in can to any footage file that After Effects supports.
- The Mocha Essentials workspace comes with a simplified user interface. This hides some of the more advanced features such as Adjust Track module, the viewer icons, and layer properties. These tools are still available and can be accessed by switching to Classic Workspace.
- GPU-accelerated planar tracking engine that significantly speeds up tracking (depends on your graphics card).
- Support for Apple Retina displays and other high-DPI monitors.
- Ellipse and Rectangle spline tools.
- Create After Effects masks or tracking data straight from the Effect Controls panel, without needing to copy and paste or relaunch the Mocha interface.

For other details about Mocha, visit the Boris FX web site.

For more details about the Mocha products, please see the comparison chart.

Note:

After Effects also includes the mocha shape for After Effects (mocha shape AE) plug-in, which converts paths from mocha-AE into mattes in After Effects. (See Resources for Imagineer mocha shape for After Effects.

Motion tracking workflows

There are many ways you can do motion tracking in After Effects, and the method and workflow you follow depend on the nature of your clip, and what you want to track.

Mask tracker

Use the mask tracker to draw masks around your object to track only certain objects in your scene.

For detailed information on the mask tracker, see Mask Tracking.

Face tracker

Simple mask tracking lets you quickly apply effects only to a face, such as selective color correction or blurring a person's face, and more.Face Tracking

However, with Face Tracking, you can track specific parts of the face such as pupils, mouth, and nose, allowing you to isolate and work on these facial features with greater detail. For example, change colors of the eyes or exaggerate mouth movements without frame-by-frame adjustments.

For detailed instructions on using the face tracker, see Face Tracking.

3D Camera tracker

Use the 3D camera tracker effect to analyze video sequences to extract camera motion and 3D scene data. You can then correctly composite 3D elements over your 2D footage.

For detailed instructions on using the 3D camera tracker, see Tracking 3D camera movement.

Point tracker

You can track one or multiple reference features in a clip:

- **One-point tracking**: Track a single reference pattern (a small area of pixels) in a movie clip to record position data.
- **Two-point tracking**: Track two reference patterns in a movie clip and use the relationship between the two tracked points to record position, scale, and rotation data.
- **Four-point tracking or Corner pin track**: Track four reference patterns in a movie clip to record position, scale, and rotation data. The four trackers analyze the relationship between four reference patterns, such as the corners of a picture frame or television monitor. This data is applied to each corner of an image or clip to "pin" the clip so that it appears locked in the picture frame or television monitor.
- **Multiple-point tracking**: Track as many reference patterns in a clip as you like. You can manually add trackers within the Analyze Motion and Stabilize behaviors. When you apply a Track Points behavior from the Shape behaviors subcategory to a shape or mask, a tracker is automatically assigned to each shape control point.

For detailed instructions on using the point tracker, see Tips for using the point tracker.

Warp stabilizer VFX

You can stabilize motion with the Warp Stabilizer effect. It removes jitter caused by camera movement, making it possible to transform shaky, handheld footage into steady, smooth shots.

For more information, see Stabilize motion with the Stabilize motion with the Warp Stabilizer VFX effect.

See Tracking and stabilizing motion for more information about using the point tracker for stabilizing motion.

For video tutorials, details, and resources about the Warp Stabilizer effect, see this article on the Adobe website.

Tips for using the point tracker

Set up the shot

For motion tracking to go smoothly, you must have a good feature to track, preferably a distinctive object or region.

For best results, prepare the object or region that you are tracking before you begin shooting. Because After Effects compares image data from one frame to the next to produce an accurate track, attaching high-contrast markers to the object or region lets After Effects more easily follow the motion from frame to frame. Lightweight, brightly colored balls (such as ping-pong balls) placed on the feature work well, in part because their appearance is the same from all angles. The number of markers that you use corresponds to the number of points you are tracking. For example, if you're tracking four points using the Perspective Corner Pinning option, you'll track four features, to correspond to the four corners of the layer to attach. The more markers you add to your subject before shooting, the more features you'll have for tracking—but the more items you may have to remove later from the image with the Clone Stamp tool. You don't need to add a marker for each feature if a distinctive object or region is already at the appropriate location.

If you're tracking a large object or the set itself—such as for match-moving—you can get good results by using a grid of uniformly spaced triangles of a uniform size as tracking markers.

Add the appropriate number of track points

When you choose a mode from the Track Type menu in the Tracker panel, After Effects places the appropriate number of track points in the Layer panel for that mode. You can add more track points to track additional features with one tracker.

Select features to track, and place feature regions

Before you begin tracking, view the entire duration of the shot to determine the best features to track. What is clearly identifiable in the first frame may later blend into the background because the angle, lighting, or surrounding elements have changed. A tracked feature may disappear off the edge of the frame or be obscured by another element at some point in the scene. Though After Effects can extrapolate the motion of a feature, your chances for successful tracking are highest if you step through the entire shot to select the best candidates for tracking.

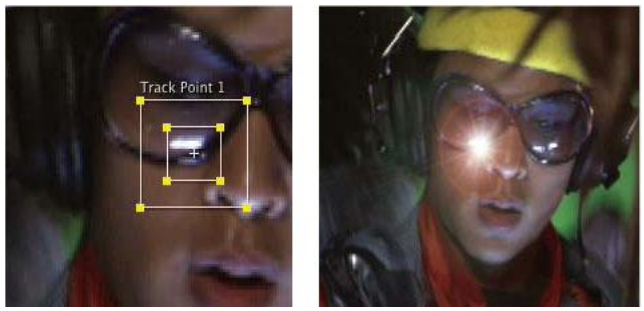
A good tracked feature has these characteristics:

- Visibility for the entire shot
- A contrasting color from the surrounding area in the search region
- A distinct shape within the search region
- A consistent shape and color throughout the shot

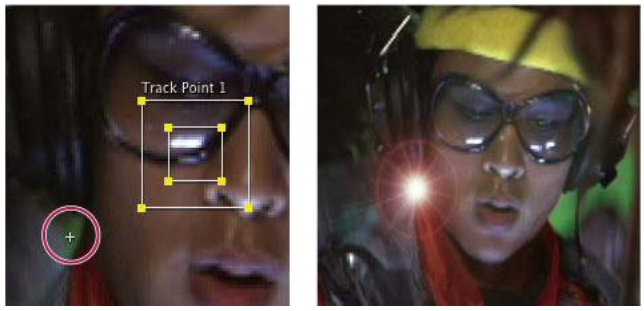
Set the attach point offset

The *attach point* is where the target layer or effect control point will be placed. The default attach point position is in the center of the feature region. You can move the attach point to offset the position of the target relative to the position of the tracked feature by dragging the attach point in the Layer panel before tracking.

For example, to animate a cloud above a person's head, position the feature region on the head and move the attach point above the head. If you left the attach point centered in the feature region, the cloud would be attached to that point and would obscure the head.



Attach point centered in feature region



Attach point offset from feature region

Adjust the feature region, search region, and tracking options

Place each feature region control tightly around its tracked feature, completely enclosing the tracked feature, but including as little of the surrounding image as possible.

The size and position of the search region depend on the movement of the feature you want to track. The search region must accommodate the movement of the tracked feature, but only the frame-to-frame movement, not its movement throughout the shot. As After Effects locates the tracked feature in a frame, both the feature region and search region move to the new location. Therefore, if the frame-to-frame movement of the tracked feature is gradual, then the search region needs to be only slightly larger than the feature region. If the feature changes position and direction quickly, then the search region needs to be big enough to encompass the largest position and direction change in any pair of frames.

You can also set tracking options that determine such things as which color channels are compared to find a match to the feature region.

Analyze

You perform the actual motion tracking step by clicking one of the Analyze buttons in the Tracker panel. When tracking a tricky set of features, you may want to analyze a frame at a time.

Repeat as necessary

Because of the changing nature of an image in motion, automatic tracking is rarely perfect. In moving footage, the shape of a feature changes, along with the lighting and surrounding objects. Even with careful preparation, a feature generally changes during a shot and at some point no longer matches the original feature. If the change is too great, After Effects may not be able to track the feature, and the track point will wander or drift.

When the analysis begins to fail, return to the frame where tracking was still accurate and repeat the adjust and analyze steps.

Apply tracking data

If you're using any Track Type setting other than Raw, you apply tracking data by clicking Apply, after making sure that the correct target is shown for Motion Target. You apply tracking data from a Raw tracking operation by copying keyframes from the trackers to other properties or by linking properties with expressions.

You can also adjust the Attach Point or Attach Point Offset property after tracking in the Timeline panel, which can be useful when applying the same tracking data to multiple targets that you want to distribute around the tracked feature.

Note:

If the layer that you're attaching has motion blur enabled, make sure that the Shutter Phase value is set to -1/2 times the Shutter Angle value. This combination of settings centers the motion blur on the attach point. Otherwise, the attached object may appear to lead or lag the object that it's attached to.

You can apply the tracking data to a null object layer and parent the layer that you want to animate to the null object layer.

Track or stabilize motion with the point tracker

Tracking motion and stabilizing motion are essentially the same process, only with a different target and result. Use Track Motion to track motion and apply the results to a different layer or effect control point. Use Stabilize Motion to track motion and apply the results to the tracked layer to compensate for that motion (for example, to remove camera shake).

To stabilize a layer, After Effects tracks the motion of a feature in the layer that should be stationary in the frame, and then uses the tracking data to set keyframes to perform the opposite motion. You can stabilize to remove any combination of changes in position, rotation, and scale, while leaving desired motion unaffected. For example, if the camera is panning, deselect Position but select Scale and Rotation as the properties to stabilize.

When you select Rotation or Scale in the Tracker panel, you set two track points in the Layer panel. A line connects the attach points; an arrow points from the first attach point (the base) to the second. If possible, place the feature regions on opposite sides of the same object, or at least on objects that are the same distance from the camera. The farther apart the regions, the more accurate the calculations and the better the result.

After Effects calculates rotation by measuring the change of angle of the line between the attach points. When you apply the tracking data to the target, After Effects creates keyframes for the Rotation property.

After Effects calculates scale by comparing the distance between attach points on each frame with the distance between the attach points on the start frame. When you apply the tracking data to the target, After Effects creates keyframes for the Scale property.

When you track motion using either parallel or perspective corner-pinning, After Effects applies keyframes for the Corner Pin effect to the layer to scale and skew the target layer as necessary to fit the four-sided area defined by the feature regions. The feature regions should lie in a single plane in the real world—for example, on the side of a bus, on the same wall, or on the floor. The attach points should also all lie in a single plane, but not necessarily the same plane as the feature regions.

Note:

For parallel corner-pinning only: To change which point is inactive, Alt-click (Windows) or Option-click (Mac OS) the feature region of the point to make inactive. (One point must remain inactive to keep the lines parallel.)

1. Select the layer to track in the Timeline panel.
2. Do one of the following:
   - Click Track Motion in the Tracker panel (or choose Animation > Track Motion), click Edit Target, and choose the target to apply the tracking data to.
   - Click Stabilize Motion in the Tracker panel (or choose Animation > Stabilize Motion). The target layer is the tracked (source) layer.
3. Select Position, Rotation, and/or Scale to specify what kinds of keyframes to generate for the target.
4. Move the current-time indicator to the frame from which to begin tracking.
5. Using the Selection tool, adjust the feature region, search region, and attach point for each track point.
6. In the Tracker panel, click either the Analyze Forward or Analyze Backward button to begin tracking.

   If the tracking ceases to be accurate, click the Stop button ■, correct the problem as described in Correct a motion track, and resume analysis.
7. When you are satisfied with the position of the feature region and attach point throughout the track, click the Apply button to apply the motion to the specified target.

   After Effects creates keyframes for the target layer.

   When tracking position and applying this position data to a target, you can choose to apply only the x (horizontal) or y (vertical) component of motion. For example, you can apply the tracking data to the x axis to make a speech bubble (the motion target) remain at the top of the frame even when the actor (the motion source) moves downward.

   - X And Y (default) allows motion along both axes.
   - X Only restricts the motion target to horizontal movement.
   - Y Only restricts the motion target to vertical movement.

   To bypass the Motion Tracker Apply Options dialog box and use the previous setting, hold Alt (Windows) or Option (Mac OS) as you click Apply.

Note:

You can change the order of steps 1-3 by first selecting the property to which to apply the tracking data (Scale, Position, or Rotation) and then choosing Animation > Track This Property. After Effects prompts you to choose the layer to use as a motion source.

When you stabilize a layer, the compensating motion may itself cause the layer to move too far in one direction, exposing the background in the composition or moving action out of the action-safe zone. You can correct this with a small change in scale for the layer. Find the frame where the problem is most severe, and then increase or decrease the scale of the layer until the problem is resolved. This technique adjusts the scale for the duration of the layer; you can also animate scale to correct this problem by zooming in and out at different times.

Motion tracking controls

You set up, initiate, and apply motion tracking with the Tracker panel.

Motion Source The layer that contains the motion to track.

Note:

Layers are available in the Motion Source menu if they have source footage items that can contain motion or if they are composition layers. You can precompose a layer to make it available in the Motion Source menu.

Current Track The active tracker. You can modify settings for a tracker at any time by selecting the tracker from this menu.

Track Type The tracking mode to use. The motion tracking itself is the same for each of these modes; they differ in the number of track points and how the tracking data is applied to the target:

- Stabilize tracks position, rotation, and/or scale to compensate for movement in the tracked (source) layer. When tracking position, this mode creates one track point and generates Anchor Point keyframes for the source layer. When tracking rotation, this mode creates two track points and produces Rotation keyframes for the source layer. When tracking scale, this mode creates two track points and produces Scale keyframes for the source layer.
- Transform tracks position, rotation, and/or scale to apply to another layer. When tracking position, this mode creates one track point on the tracked layer and sets Position keyframes for the target. When tracking rotation, this mode creates two track points on the tracked layer and sets Rotation keyframes for the target. When tracking scale, this mode creates two track points and produces Scale keyframes for the target.
- Parallel Corner Pin tracks skew and rotation, but not perspective; parallel lines remain parallel, and relative distances are preserved. This mode uses three track points in the Layer panel—and calculates the position of the fourth—and sets keyframes for four corner points in a Corner Pin effect property group, which is added to the target. The four attach points mark the placement of the four corner points.
- Perspective Corner Pin tracks skew, rotation, and perspective changes in the tracked layer. This mode uses four track points in the Layer panel and sets keyframes for four corner points in a Corner Pin effect property group, which is added to the target. The four attach points mark the placement of the four corner points. This option is useful for attaching an image to an opening door or the side of a bus that's turning a corner.
- Raw tracks position only. Use Raw to generate tracking data that you won't apply using the Apply button. For example, you can copy and paste the keyframes for the Attach Point property to the Position property for a paint stroke; or, you can link effect properties for the Stereo Mixer effect to the x coordinate of the Attach Point property using expressions. Tracking data is stored on the tracked layer. The Edit Target button and the Apply button are not available with this tracking option. You can add track points to a tracker by choosing New Track Point from the Tracker panel menu.

Motion Target The layer or effect control point that the tracking data is applied to. After Effects adds properties and keyframes to the target to move or stabilize it. Change the target by clicking Edit Target. No target is associated with a tracker if Raw is selected for Track Type.

Analyze buttons Begins the frame-to-frame analysis of the track point in the source footage:

- Analyze 1 Frame Backward : Analyze the current frame by moving back to the previous frame.
- Analyze Backward : Analyze from the current-time indicator backward to the beginning of the trimmed layer duration.
- Analyze Forward : Analyze from the current-time indicator to the end of the trimmed layer duration.
- Analyze 1 Frame Forward : Analyze the current frame by advancing to the next frame.

Note:

While analysis is in progress, the Analyze Backward and Analyze Forward buttons change to a Stop button, with which you can stop analysis when the track drifts or otherwise fails.

Reset Restores the feature region, search region, and attach point to their default positions and deletes the tracking data from the currently selected track. Tracker control settings and keyframes already applied to the target layer remain unchanged.

Apply Sends the tracking data (in the form of keyframes) to the target layer or effect control point.

Motion tracking options

These settings apply to a tracker, a group of track points that is generated in one tracking session. You can modify these settings by clicking Options in the Tracker panel.

Track Name The name for a tracker. You can also rename a tracker by selecting it in the Timeline panel and pressing Enter on the main keyboard (Windows) or Return (Mac OS).

Tracker Plug-in The plug-in used to perform motion tracking for this tracker. By default, this option displays Built-in, the only tracking plug-in included with After Effects.

Channel The components of the image data to use for comparison when searching for a match for the feature region. Select RGB if the tracked feature is a distinct color. Select Luminance if the tracked feature has a different brightness than the surrounding image (such as a burning candle carried through a room). Select Saturation if the tracked feature has a high concentration of color, surrounded by variations of the same color (such as a bright red scarf against a brick wall).

Process Before Match Temporarily blurs or sharpens an image to improve tracking. Blur reduces noise in the footage. Usually a value of 2 to 3 pixels is enough to produce better tracks in grainy or noisy footage. Enhance exaggerates or refines the edges of an image and makes them easier to track.

Note:

After Effects blurs or enhances the layer only for tracking. This blurring does not affect the motion source layer.

Track Fields Temporarily doubles the frame rate of the composition and interpolates each field to a full frame to track motion in both fields of interlaced video.

Subpixel Positioning When selected, keyframes are generated to a precision of a fraction of a pixel. When deselected, the tracker rounds off values to the nearest pixel for generated keyframes.

Adapt Feature On Every Frame Causes After Effects to adapt the tracked feature for each frame. The image data that is searched for within the search region is the image data that was within the feature region in the previous frame, rather than the image data that was in the feature region at the beginning of analysis.

If Confidence Is Below Specifies the action to perform when the Confidence property value is below the percentage value that you specify.

Note:

To determine an acceptable confidence threshold, track the motion and then examine the Confidence values for the track point in the Timeline panel for problematic frames. Specify a confidence value that is slightly larger than the largest confidence value for the problematic frames.

- Select Continue Tracking to ignore the Confidence value. This behavior is the default behavior.
- Select Stop Tracking to stop the motion tracking.
- Select Extrapolate Motion to estimate the position of the feature region. Attach-point keyframes aren't created for low-confidence frames, and attach-point keyframes for the low-confidence frames from previous tracks are deleted.
- Select Adapt Feature to use the original tracked feature until the confidence level falls below the specified threshold. At that point, After Effects adapts the tracked feature to be the contents of the feature region in the frame preceding the one that has low confidence and continues tracking. This option isn't available if Adapt Feature On Every Frame is selected in the Motion Tracker Options dialog box; enabling feature adaptiveness causes After Effects to adapt the feature region with every frame regardless of the confidence level.

Options Opens the Tracker Plug-in Options dialog box, which includes options for the AE Original Built-in Tracker. This command is available only if you choose to use the older After Effects tracker plug-in.

Note:

To show or hide motion paths in the Layer panel, select or deselect the Display Motion Paths option in the panel menu of the Tracker panel. (The panel menu is the menu that you access by clicking the icon in the upper-right corner of a panel.) You can also use commands in this menu to add a new track point, reveal the current track in the Timeline panel, and toggle whether the feature region magnification is enabled.

Motion tracking properties in the Timeline panel

Each time you click Track Motion or Stabilize Motion in the Tracker panel (or choose Animation > Track Motion or Animation > Stabilize Motion), After Effects creates a new tracker for the layer in the Timeline panel. Each tracker contains track points, which are property groups that store the tracking data after tracking has been performed. After Effects groups trackers in the Motion Trackers property group for each layer in the Timeline panel.

To show a tracker in the Timeline panel, select the tracker from the Current Track menu in the Tracker panel and press SS.

You can rename trackers and track points and modify and animate their property values in the Timeline panel just as you do for other layer properties and property groups. You must click Apply in the Tracker panel to apply the property changes to the target.

Feature Center Position of the center of the feature region.

Feature Size Width and height of the feature region.

Search Offset Position of the center of the search region relative to the center of the feature region.

Search Size Width and height of the search region.

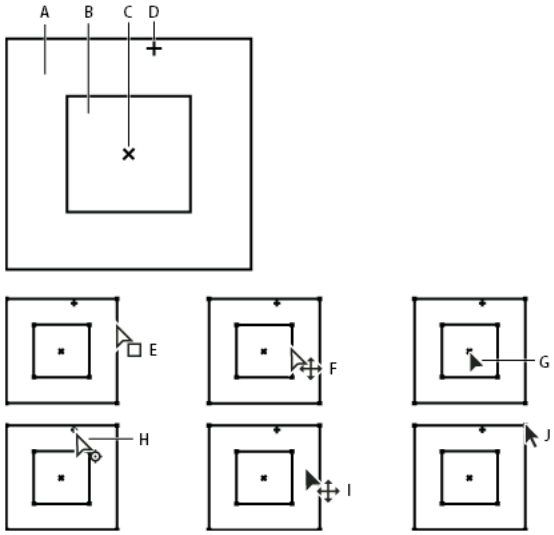
Confidence Property through which After Effects reports the amount of certainty regarding the match made for each frame. In general, Confidence is not a property that you modify.

Attach Point Position assigned to the target layer or effect control point.

Attach Point Offset Position of the attach point relative to the center of the feature region.

Adjust the track point

When you set up motion tracking, it's often necessary to refine your track point by adjusting the feature region, search region, and attach point. You can resize or move these items independently or in groups by dragging using the Selection tool. To help you define the area to be tracked, the image area within the feature region is magnified to 400% while you move the region.



Track point components and Selection tool pointer icons
***A** Search region **B** Feature region **C** Keyframe marker **D** Attach point **E** Moves search region **F** Moves both regions **G** Moves entire track point **H** Moves attach point **I** Moves entire track point **J** Resizes region*

- To turn on or off feature region magnification, choose Magnify Feature When Dragging from the Tracker panel menu.
- To move the feature region, search region, and attach point together, drag inside the track point area (avoiding the region edges and the attach point), or press the Up, Down, Left, or Right Arrow key. Hold Shift while pressing an arrow key to move by an increment 10 times as large.
- To move only the feature and search regions together, drag the edge of the feature region, or Alt-drag (Windows) or Option-drag (Mac OS) with the Selection tool inside the feature or search region. You can also hold Alt (Windows) or Option (Mac OS) while pressing the Up, Down, Left, or Right Arrow key. Hold Alt+Shift (Windows) or Option+Shift (Mac OS) while pressing an arrow key to move by an increment 10 times as large.
- To move only the search region, drag the edge of the search region.

Offset the search region center from the feature region center in the direction in which the tracked feature is traveling.

- To move only the attach point, drag the attach point.
- To resize the feature or search region, drag a corner handle.
- To make all of the sides of the region match the length of the longest side, and to resize the region relative to the original center point of the region, Shift-drag a corner handle.
- To make all of the sides of the region match the length of the longest side, and to resize the region relative to a particular corner handle, Ctrl+Shift-drag (Windows) or Command+Shift-drag (Mac OS) the opposite corner handle.

To restrict the movement of the track point to the x (horizontal) or y (vertical) axis during tracking, resize the height or width of the search region to match the height or width of the feature region.

Apply tracking data to a new target

After you've tracked a motion source layer, you can apply the tracking data stored on that layer to any number of other target layers and effect control points. For example, you can apply the track to the position of a light bulb and to the effect control point of the Lens Flare effect.

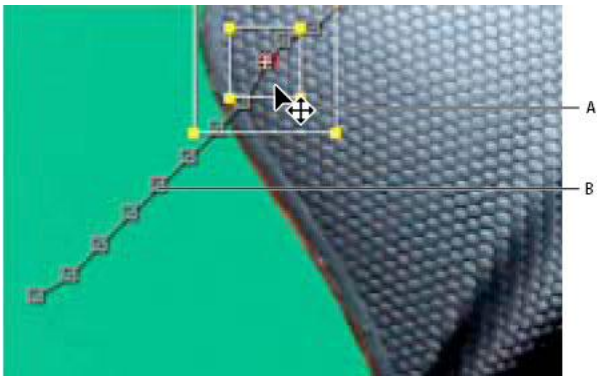
1. In the Tracker panel, choose the tracked layer from the Motion Source menu.
2. Choose the track that contains the tracking data you want from the Current Track menu.
3. Click Edit Target, and choose the target.
4. In the Tracker panel, click the Apply button.

Correct a motion track

As an image moves in a shot, the lighting, surrounding objects, and angle of the object can all change, making the once-distinct feature no longer identifiable at the subpixel level. Also, if the search region is too small, the tracked feature may leave its bounds from one frame to the next.

Learning to choose a trackable feature takes time. Even with careful planning and practice, the feature region can drift away from the desired feature. Re-adjusting the feature and search regions, changing the tracking settings, and trying again is a standard part of automatic tracking. It's not necessary to get a single good track in one try. You may need to track the shot in sections, redefining the feature region in places where the feature changes and the region drifts. You may even need to choose a different feature to track, one with movement that closely matches that of the feature to track, and use the attach point offset to place the target.

After you've tracked motion, each track point has a motion path in the Layer panel that shows the position of the center of the feature region. You can fine-tune the keyframes of the motion path in the Layer panel as you would any other motion path. Modifying the motion path is most useful when you want to manually change the motion tracking data before applying it to a target. In some cases, it may be easier to manually modify the motion path created by the motion tracker than to get a perfect track.



Motion source and its motion path
***A** Moving the feature and search regions **B** Keyframe marker*

Correct drifting by adjusting the feature and search regions

1. Move the current-time indicator to the last well-tracked frame.
2. Alt-drag (Windows) or Option-drag (Mac OS) the feature and search regions only (not the attach point) to the correct location.
3. If you are correcting the track for one frame, go to step 4. If you are correcting the track for several contiguous frames, adjust the feature region and search region if necessary, and click Analyze. Watch the tracking to make sure that it is accurate. If the tracking is not accurate, then click the button again to stop tracking, adjust the feature region, and begin again.
4. When you are satisfied with the track, click Apply to apply the keyframes to the target layer or effect control point.

Correct drifting by modifying tracking settings

1. Move the current-time indicator to the last well-tracked frame.
2. In the Tracker panel, click Options.
3. Change settings in the Motion Tracker dialog box as appropriate. (See Motion tracking options.)
4. In the Tracker panel, click the Analyze Forward or the Analyze Backward button.
5. Watch the tracking to make sure that it is accurate. If the tracking is not accurate, then click the button again to stop tracking, adjust the settings, and begin again.
6. When you are satisfied with the track, click Apply to apply the keyframes to the target layer or effect control point.

Stabilize motion with the Warp Stabilizer VFX effect

You can stabilize motion with the Warp Stabilizer effect. It removes jitter caused by camera movement, making it possible to transform shaky, handheld footage into steady, smooth shots. See Tracking and stabilizing motion for more information about using the point tracker for stabilizing motion.

For video tutorials, details, and resources about the Warp Stabilizer effect, see this article on the Adobe website.

Warp Stabilizer VFX | After Effects CC

Warp Stabilizer VFX | After Effects CC

Stabilize with the Warp Stabilizer effect

To stabilize motion using the Warp Stabilizer effect, do the following:

1. Select the layer you want to stabilize.
2. Do one of the following:

   In After Effects CC:

   - Go to the Effects & Presets panel > Distort and apply the Warp Stabilizer VFX to the layer.
   - Right-click the footage item in the Timeline panel and choose Warp Stabilizer VFX.

   After the effect is added to the layer, analysis of the footage begins immediately in the background. As analysis begins, the first of two banners displays in the Composition panel indicating that analysis is occurring. When analysis is complete, the second banner displays a message that stabilization is occurring.

   You are free to work with the footage or elsewhere in the project while these steps are occurring.

Warp Stabilizer VFX / settings

Analyze

There is no need to press this button when you first apply Warp Stabilizer; it's pressed for you automatically. The Analyze button remains dimmed until some change takes place. For example, if you adjust a layer's In or Out points, or there is an upstream change to the layer source. Click the button to reanalyze the footage.

Note:

Analysis does not take into account any masks or effects that are applied directly to the same layer. Pre-compose and place them in the upstream composition if you want them to be analyzed.

Cancel

Cancels an analysis in progress. During analysis, status information appears next to the Cancel button.

Stabilization

Stabilization settings allow for adjusting the stabilization process.

Result Controls the intended result for the footage (Smooth or No Motion).

- **Smooth motion (default)**: Retains the original camera movement but makes it smoother. When selected, Smoothness is enabled to control how smooth the camera movement becomes.
- **No Motion**: Attempts to remove all camera motion from the shot. When selected, the Crop Less <-> Smooth More function is disabled in the Advanced section. This setting is used for footage where at least a portion of the main subject remains within the frame for the entire range being analyzed.

Smoothness Chooses how much the camera's original motion is stabilized. Lower values are closer to the camera's original motion while higher values are smoother. Values above 100 require more cropping of the image. Enabled when the Result is set to Smooth Motion.

Method Specifies the most complex operation the Warp Stabilizer performs on the footage to stabilize it:

- **Position** Tracking is based on position data only and is the most basic way footage can be stabilized.
- **Position, Scale And Rotation** Stabilization is based upon position, scale, and rotation data. If there are not enough areas to track, Warp Stabilizer chooses the previous type (Position).
- **Perspective**: Uses a type of stabilization in which the entire frame is effectively corner-pinned. If there are not enough areas to track, Warp Stabilizer chooses the previous type (Position, Scale, Rotation).
- **Subspace Warp (default)**: Attempts to warp various parts of the frame differently to stabilize the entire frame. If there are not enough areas to track, Warp Stabilizer choose the previous type (Perspective).

  The method in use on any given frame can change across the course of the clip based on the tracking accuracy.

  Note: In some cases, Subspace Warp can introduce unwanted warping, and Perspective can introduce unwanted keystoning. You can prevent anomalies by choosing a simpler method.

Preserve Scale (After Effects) When enabled, prevents the Warp Stabilizer from trying to adjust forward and backward camera movements with scale adjustments.

Borders

Borders settings adjust how borders (the moving edges) are treated for footage that is stabilized.

Framing Controls how the edges appear in a stabilizing result. Framing can be set to one of the following:

- **Stabilize Only**: Displays the entire frame, including the moving edges. Stabilize Only shows how much work is being done to stabilize the image. Using Stabilize Only allows you to crop the footage using other methods. When selected, the Auto-scale section and Crop Less <-> Smooth More property are disabled.
- **Stabilize, Crop**: Crops the moving edges without scaling. Stabilize, Crop is identical to using Stabilize, Crop, Auto-scale, and setting Maximum Scale to 100%. With this option enabled, the Auto-scale section is disabled, but the Crop Less <-> Smooth More property is enabled.
- **Stabilize, Crop, Auto-scale (default)**: Crops the moving edges and scales up the image to refill the frame. The automatic scaling is controlled by various properties in the Auto-scale section.
- **Stabilize, Synthesize Edges**: Fills in the blank space created by the moving edges with content from frames earlier and later in time (controlled by Synthesizes Input Range in the Advanced section). With this option, the Auto-scale section and Crop Less <-> Smooth More are disabled.

Note:

It is possible for artifacts to appear when there is movement at the edge of the frame not related to camera movement.

Auto-scale Displays the current auto-scale amount, and allows you to set limits on the amount of auto-scaling. Enable Auto-scale by setting framing to Stabilize, Crop, Auto-scale.

- **Maximum Scale:** Limits the maximum amount a clip is scaled up for stabilization.
- **Action-Safe Margin:** When non-zero, specifies a border around the edge of the image that you don't expect to be visible. Thus, auto-scale does not try to fill it.

Additional Scale Scales up the clip with the same result as scaling using the Scale property under Transform, but avoids an extra resampling of the image.

Advanced

Detailed Analysis When set to on, makes the next Analysis phase do extra work to find elements to track. The resulting data (stored in the project as part of the effect) is much larger and slower with this option enabled.

Rolling Shutter Ripple The stabilizer automatically removes the rippling associated with stabilized rolling shutter footage. Automatic Reduction is the default. Use Enhanced Reduction if the footage contains larger ripples. To use either method, set the Method to Subspace Warp or Perspective.

Crop Less <-> Smooth More When cropping, controls the trade-off between smoothness and scaling of the cropping rectangle as it moves over the stabilized image. Lower values are smooth, however, more of the image is viewed. At 100%, the result is the same as the Stabilize Only option with manual cropping.

Synthesis Input Range (seconds) Used by Stabilize, Synthesize Edges framing, controls how far backward and forward in time the synthesis process goes to fill in any missing pixels.

Synthesis Edge Feather Selects the amount of feather for the synthesized pieces. It is enabled only when using the Stabilize, Synthesize Edges framing. Use the feather control to smooth over edges where the synthesized pixels join up with the original frame.

Synthesis Edge Cropping Trims off the edges of each frame before it is used to combine with other frames when using the Stabilize, Synthesize Edges framing option. Use the cropping controls to crop off bad edges that are common in analog video capture, or low quality optics. By default, all edges are set to zero pixels.

Objective Determines the aim for the effect: for stabilizing, for temporary stabilization to perform visual effects work, or to composite a layer into a shaky scene. Choose an objective:

- **Stabilize** Default option for normal stabilization
- **Reversible Stabilization and Reverse Stabilization** Use these options to apply an effect to a region. Use two instances of the Warp Stabilizer VFX effect, one with Reversible Stabilization to steady a shaky object, and a duplicate instance with Reverse Stabilization to insert the shake back in, so that any effects you apply after Reversible Stabilization appear within the original scene.
- **Apply Motion to Target and Apply Motion to Target over Original** Use these options to composite a layer into a shaky scene to apply the stabilized motion onto a different layer.

Target Layer Choose a layer to which the stabilized motion is applied using the **Apply Motion to Target** or **Apply Motion to Target over Original** options.

Show Track Points Determines if track points are displayed.

Track Point Size Determines the size of the displayed track points

Auto-delete Points Across Time When you delete track points in a composition panel, corresponding track points on the same object, are deleted at other times on the layer. You do not need to manually delete the track points frame-by-frame.

Hide Warning Banner Use when you don't want to reanalyze footage even though there is a warning banner indicating that it must be reanalyzed.

Warp Stabilizer workflow tips

1. Apply Warp Stabilizer VFX.
2. While the Warp Stabilizer effect is analyzing your footage, you can adjust settings or work on a different part of your project.
3. Choose Stabilization > Result > No Motion if you want to completely remove all camera motion. Choose Stabilization > Result > Smooth Motion if you want to include some of the original camera movement in the shot.
4. If the result is good, you're done with stabilization. If not, do one or more of the following:
   - If the footage is too warped, or distorted, switch the Method to Position, Scale, Rotation.
   - If there are occasional rippled distortions, and footage was shot with a rolling shutter camera, set Advanced > Rolling Shutter Ripple to Enhanced Reduction.
   - Try checking Advanced > Detailed Analysis.
5. If the result is too cropped, reduce either Smoothness or Crop Less <-> Smooth More. Crop Less <-> Smooth More is much more responsive, as it doesn't require a restabilize phase.
6. If you want to get a feel for how much work the stabilizer is actually doing, set the Framing to Stabilize Only.

When Framing is set to one of the cropping options and the cropping gets extreme, a red banner appears saying, “To avoid extreme cropping set Framing to Stabilize Only or adjust other parameters." In this situation, you can either set Framing to Stabilize Only, or Stabilize, Synthesize Edges. Other options include reducing the value of Crop Less <-> Smooth More, or reducing Smoothness. Or, if you are satisfied with the results, enable the Hide Warning Banner option.

Changes to expressions in After Effects

Note:

Before you install After Effects CC 2015, read this article about keeping previous versions installed. For details of what's new and changed, read this article.

The interactive performance improvements in After Effects include significant enhancements to how expressions are evaluated. Expressions are now evaluated on the render thread, meaning the user interface no longer slows down while an expression is calculating. Cache markings affected by an expression, for example, are updated instead of waiting for the expression to complete. Some expression-heavy compositions render faster due to expanded use of the internal expression cache Faster rendering occurs especially when one expression is dependent on the results of other expressions.

What is more visible as you work is that when an expression fails to evaluate:

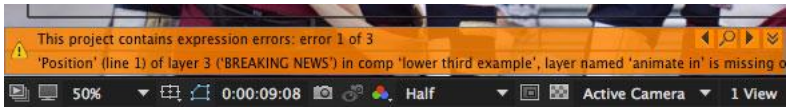
- Expression errors appear in a warning banner at the bottom of the Composition and Layer panels instead of in a dialog box.
- The expression is not automatically disabled and continues to evaluate.

The warning banner displays as long as the expression fails to evaluate; that is, until the expression is either fixed or manually disabled.

When you have multiple expressions that fail, you no longer need to click through all the error dialog boxes that appear. Also, when you fix the cause of an expression's failure (including simply undoing the change), you no longer have to click to re-enable it.

Previously, changing a single property or deleting a single layer could cause hundreds of related expressions to fail. These changes provide some relief to the fingers of expression-heavy users.

Here's an example of what the expression error warning banner looks like:


This project contains expression errors: error 1 of 3
'Position' (line 1) of layer 3 ('BREAKING NEWS') in comp 'lower third example', layer named 'animate in' is missing
50%
0:00:09:08
Half
Active Camera
1 View

On the right side of the expression error warning banner are control buttons:

- The left or right arrow buttons display the previous or next expression error when multiple expressions fail to evaluate.
- The Reveal Expression (magnifying glass) button exposes the property with the failing expression in the Timeline panel. If the expression is in a different composition, that composition opens.
- The Expand/Collapse Warning (up/down arrows) button shows or hides the error text.

Note:

The expression error text is one line only, and is clipped to the width of the Composition panel. To see the full expression error text in the old-style dialog box, click the yellow error triangle icon next to the expression in the Timeline panel.

You can hide the entire warning banner if you find it distracting.

Choose Edit > Preferences > General (Windows) or After Effects > Preferences > General (Mac OS), and then disable Show Warning Banner When Project Contains Expressions Errors.

When this option is disabled, the warning banner remains hidden even when new expression errors occur. Re-enable this option to view expression errors.

Let us know what you think about the changes to expression evaluation on the After Effects forum.

Chapter 8: Color

Color basics

Color depth and high dynamic range color

Color depth (or *bit depth*) is the number of bits per channel (bpc) used to represent the color of a pixel. The more bits for each RGB channel (red, green, and blue), the more colors each pixel can represent.

In After Effects, you can work in 8-bpc, 16-bpc, or 32-bpc color.

In addition to color bit depth, a separate characteristic of the numbers used to represent pixel values is whether the numbers are integers or floating-point numbers. Floating-point numbers can represent a much larger range of numbers with the same number of bits. In After Effects, 32-bpc pixel values are floating-point values.

8-bpc pixels can have values for each color channel from 0 (black) to 255 (pure, saturated color). 16-bpc pixels can have values for each color channel from 0 (black) to 32,768 (pure, saturated color). If all three color channels have the maximum, pure-color value, the result is white. 32-bpc pixels can have values under 0.0 and values over 1.0 (pure, saturated color), so 32-bpc color in After Effects is also *high dynamic range* (HDR) color. HDR values can be much brighter than white.

Setting the color depth and modifying color display settings

The color depth setting for a project determines the bit depth for color values throughout a project.

To set the color depth for a project, do one of the following:

- Alt-click (Windows) or Option-click (Mac OS) the Project Settings button in the Project panel.
- Choose File > Project Settings or click the Project Settings button in the Project panel, and choose a color depth from the Depth menu.

You can specify a color depth for each render item, which overrides the project color depth when rendering for final output. You can also specify the color depth to use for each output item in the output module settings. (See Render settingsand Output modules and output module settings.)

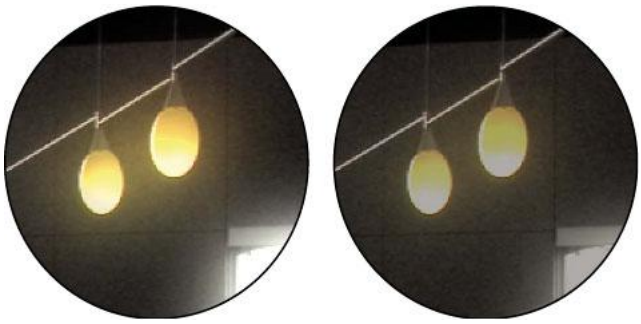
To change the format in which color values are shown in the Info panel and in some effect controls, choose an option such as Percent or Web from the Info panel menu. Choosing Auto Color Display automatically switches between 8 bpc, 16 bpc, and 32 bpc, depending on the color depth of the project.

Though many effects can work with all color depths, some effects work only with lower color depths. You can set the Effects & Presets panel to only show effects that work with your current project color depth. (See .)

Comparative advantages of each color depth

The dynamic range (ratio between dark and bright regions) in the physical world far exceeds the range of human vision and of images that are printed on paper or displayed on a monitor. Low dynamic range 8-bpc and 16-bpc color values can represent RGB levels only from black to white, which is only a small segment of the dynamic range in the real world.

High dynamic range (HDR), 32-bpc floating-point color values can represent brightness levels much greater than white, including objects as bright as a flame or the Sun.



Glow effect and Gaussian Blur effect applied to image in 32-bpc project (left) and 16-bpc project (right)

Set the project color depth to 32 bpc to work with HDR footage or to work with over-range values—values above 1.0 (white) that aren't supported in 8- or 16-bpc mode. Over-range values preserve the intensity of highlights, which is as useful for synthetic effects such as lights, blurs, and glows as it is for working with HDR footage. The headroom provided by working in 32 bpc prevents many kinds of data loss during operations such as color correction and color profile conversion.

Even if you're using 8-bpc footage and are creating movies in 8-bpc formats, you can obtain better results by having the project color depth set to 16 bpc or 32 bpc. Working in a higher bit depth provides higher precision for calculations and greatly reduces quantization artifacts, such as banding in gradients.

Note:

Merely increasing the color depth within a project won't eliminate gradients if the output format has a low bit depth. To mitigate banding, After Effects introduces dithering of colors when the colors are converted to 8-bpc colors, including when rendering and exporting to an 8-bpc format. This dithering is not introduced for previews. To force dithering for previews, apply an 8-bpc effect that does nothing—such as the Arithmetic effect with the default values—to an adjustment layer.

Because 16-bpc frames use half the memory of 32-bpc frames, rendering previews in a 16-bpc project is faster, and previews can be longer than in a 32-bpc project. 8-bpc frames use even less memory, but the tradeoff between quality and performance can be obvious in some images at a project color depth of 8 bpc.

Special considerations for working with high dynamic range color

You can use the HDR Compander effect to compress the dynamic range of a layer with an HDR footage item as its source. In this way, you can use tools that don't support HDR color, such as 8-bpc and 16-bit effects. When you're done, use the HDR Compander to undo the dynamic range compression. The HDR Highlight Compression effect lets you compress the highlight values in an HDR image so that they fall within the value range of a low dynamic range image.

Because we can see only a subset of the luminance values in a real-world scene in an HDR image on a monitor, it is sometimes necessary to adjust the exposure—the amount of light captured in an image—when working with an HDR image. Adjusting the exposure of an HDR image is like adjusting the exposure when photographing a scene in the real world, allowing you to bring detail out of dark or bright areas. You can use the Exposure effect to change the color values of a layer for final output, or you can just adjust the exposure in a specific viewer for preview purposes.

Note:

Because some operations—including glows, blurs, and some blending modes—behave differently in 32-bpc mode as compared with 8-bpc or 16-bpc mode, your composition may look significantly different when you switch between high dynamic range and low dynamic range project settings.

Additional resources about high dynamic range color

Chris Meyer explains what floating-point, 32-bpc, HDR color is good for in a video overview on the Lynda.com website.

Andrew Kramer provides a video tutorial on his Video Copilot website in which he demonstrates the advantages of using 32-bpc color with motion blur.

On his fnord website, Brendan Bolles explains how to use the Color Profile Converter effect and film color profiles to adjust colors and perform tone mapping to make an HDR image appear as if it were shot on motion picture film.

Select a color or edit a gradient

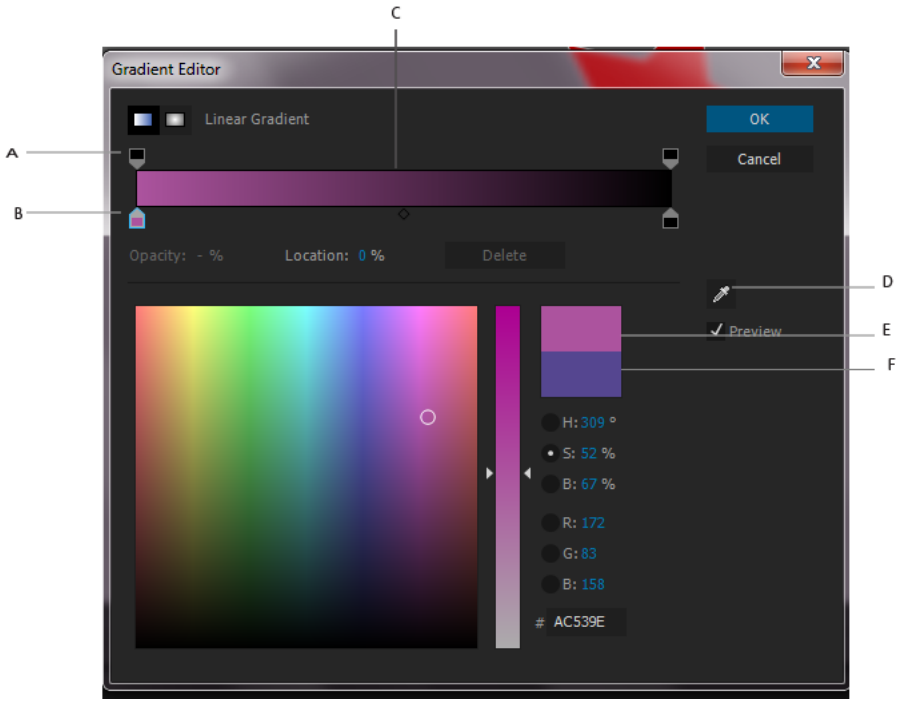
In many contexts, you can click an eyedropper button to activate the eyedropper tool, or you can click a color swatch to open a color picker. If you use the Adobe Color Picker, you can also activate the eyedropper from the Adobe Color Picker dialog box.

If you click a gradient swatch (**Linear Gradient** or **Fill Gradient**) for a stroke or fill in a shape layer, the Adobe Color Picker opens as the Gradient Editor, with additional controls for editing gradients included at the top of the dialog box. You can also click Edit Gradient in the Timeline panel to open the Gradient Editor.

Andrew Devis shows how to modify gradient fills and strokes for shape layers, plus other options, in a video on the Creative COW website.

Note:

The sampleImage expression method is another way to sample color values. Use this method to use color values of specific pixels as input into an expression. (See Layer General attributes and methods (expression reference).)



A Opacity Stop B Color Stop C Opacity midpoint D Eyedropper E New color rectangle F Original color rectangle

Choose a color picker

- To choose the system color, choose **Edit > Preferences > General** (Windows) or **AfterEffects > Preferences > General** (Mac OS) and check the **Use System Color Picker** box.
- To use the **Adobe Color Picker**, keep the **Use System Color Picker** box unchecked and select **Window > Extensions > Adobe Color** Themes.

Jeff Almasol provides the PickerSwitcher script on his redefinery website, which toggles the Use System Color Picker setting. Use this script when you prefer to use the Adobe Color Picker for certain tasks, but the operating system color picker for others, and want a quick way to change this setting.

Select a color with the eyedropper tool

1. Click the eyedropper button, and move the pointer to the pixel that you want to sample. The color swatch next to the eyedropper button dynamically changes to the color under the eyedropper.
2. Do one of the following:
   - To select the color of a single pixel, click the pixel.
   - To sample the color average of a 5-pixel-by-5-pixel area, Ctrl-click (Windows) or Command-click (Mac OS) the area.

   Note:

   When sampling from within the composition frame of the Composition panel, the eyedropper by default ignores the composition background color and samples only straight color channels. To sample color channels premultiplied with the composition background color, press Shift as you click with the eyedropper. Shift-clicking with the eyedropper samples colors as they appear in the composition frame in the Composition panel.

Press the Escape key to deactivate the eyedropper.

Select a color with the Adobe Color Picker

In the Adobe Color Picker, you can choose colors using one of the color models, or use the color slider and the color field to choose your color.

The following color models are available:

- HSB
- RGB
- Lab
- CMYK
- Hex

Use the color slider to pick a color:

- Drag the triangles along the color slider, or click inside the color slider to adjust the colors displayed in the color spectrum.
- Click or drag inside the large square color spectrum to select a color. A circular marker indicates the location of the color in the color spectrum.

1 Click **Windows > Extensions > Adobe Color Themes** to display the Adobe Color Picker.

2 (Optional) To prevent panels from updating with the results of your color selection until you accept the color by clicking OK, deselect Preview in the Color Picker dialog box. The Preview option is not available in all contexts.

Note:

Selecting Preview is convenient for seeing the results of your color selections before you commit them, but it can also decrease performance, as new images are rendered for the preview in the Composition panel or Layer panel.

3 Enter the component values in the text boxes. Select the component you want to use to display the color spectrum:

HSB

For HSB, specify hue (H) as an angle, from 0° to 360°, that corresponds to a location on the color wheel. Specify saturation (S) and brightness (B) as percentages (0–100).

H Displays all hues in the color slider. Selecting a hue in the color slider displays the saturation and brightness range of the selected hue in the color spectrum, with the saturation increasing from left to right and brightness increasing from bottom to top.

S Displays all hues in the color spectrum with their maximum brightness at the top of the color spectrum, decreasing to their minimum at the bottom. The color slider displays the color that's selected in the color spectrum with its maximum saturation at the top of the slider and its minimum saturation at the bottom.

B Displays all hues in the color spectrum with their maximum saturation at the top of the color spectrum, decreasing to their minimum saturation at the bottom. The color slider displays the color that's selected in the color spectrum with its maximum brightness at the top of the slider and its minimum brightness at the bottom.

RGB

For RGB, specify component values. You can set colors to under-range and over-range values (outside the range 0.0–1.0) in an HDR project.

R Displays the red color component in the color slider with its maximum brightness at the top of the slider and its minimum brightness at the bottom. When the color slider is set to minimum brightness, the color spectrum displays colors created by the green and blue color components. Using the color slider to increase the red brightness mixes more red into the colors displayed in the color spectrum.

G Displays the green color component in the color slider with its maximum brightness at the top of the slider and its minimum brightness at the bottom. When the color slider is set to minimum brightness, the color spectrum displays colors created by the red and blue color components. Using the color slider to increase the green brightness mixes more green into the colors displayed in the color spectrum.

B Displays the blue color component in the color slider with its maximum brightness at the top of the slider and its minimum brightness at the bottom. When the color slider is set to minimum brightness, the color spectrum displays colors created by the green and red color components. Using the color slider to increase the blue brightness mixes more blue into the colors displayed in the color spectrum.

CMYK

Specify each component value as a percentage of cyan, magenta, yellow, and black in the text field to get a specific color.

Lab

L Denotes the luminance of a color (from 0 to 100)

a The extent of red or green in a color (from -128 to +127)

b The extent of blue or yellow in a color (from -128 to +127)

Hex

Enter values in hexadecimal form. Numbers can range from #000000 to #ffffff. For example, #000000 represents black, and #ffffff represents white.

Edit a gradient

A gradient is defined by *color stops* and *opacity stops*. Each stop has a location along the gradient and a value for color or opacity. The values between stops are interpolated. By default, the interpolation is linear, but you can drag the opacity midpoint or color midpoint between two stops to alter the interpolation.

- To add a color stop or opacity stop, click below or above the gradient bar in the Gradient Editor dialog box.
- To remove a stop, drag it away from the gradient bar, or select the stop and click Delete.
- To edit the value of a stop, select it and adjust the Opacity value or use the Adobe Color Picker controls beneath the gradient editor controls.
- To choose a gradient type, click the Linear Gradient or Radial Gradient button in the upper-left corner of the Gradient Editor dialog box.

Note:

Use the Style property to choose a gradient type for the Gradient Overlay layer style.

Learn tutorial

You can create and save color themes, explore and search existing themes, and browse your saved color themes using your Adobe Creative Cloud profile. See this tutorial to learn to use Adobe Color in After Effects.

Color correction, color grading, and color adjustment

When you assemble a composition, you often need to adjust or correct the colors of one or more of the layers. Such adjustments can be for any of several reasons. Some examples:

- You need to make it seem as if multiple footage items were shot under the same conditions so that they can be composited or edited together.
- You need to adjust the colors of a shot so that it seems to have been shot at night instead of day.
- You need to adjust the exposure of an image to recover detail from the over-exposed highlights.
- You need to enhance one color in a shot because you will be compositing a graphic element over it with that color.
- You need to restrict colors to a particular range, such as the broadcast-safe range.

The terms *color correction* and *color grading* are often used interchangeably, though the term *color grading* is sometimes used to refer distinctly to color adjustments made for creative purposes rather to correct problems with color. The term *color correction* is used in the broad, general sense in After Effects.

After Effects includes many built-in effects for color correction, including the Curves effect, the Levels effect, and other effects in the Color Correction effects category. You can also use the Apply Color LUT effect to apply the color mappings in a color lookup table for color correction purposes. (See and .)

The Camera Raw plug-in can be used to correct and adjust still images in JPEG, TIFF, and various camera raw formats.

The Synthetic Aperture Color Finesse plug-in included with After Effects includes excellent color-correction tools. After Effects CC and CS6 include Synthetic Aperture Color Finesse 3. (See Resources for Synthetic Aperture Color Finesse.)

Additional resources for color correction and adjustment

This Adobe blog articlecollects several video tutorials and other resources for color correction and color grading in After Effects and Premiere Pro.

John Dickinson provides visual aids on his Motionworks website that illustrate how to use the Curves and Levels effects for color adjustments:

- Curves effect diagram on Motionworks website

This video from After Effects: Learn By Video series shows how to combine motion tracking and rotoscoping to isolate and selectively color-correct an actor's face.

The Rebel CC animation preset is a simple, telecine-style color-correction tool for coloring or grading a movie. This animation preset uses expressions to control the Levels (Individual Controls) effect. To learn more and download the animation preset, see Stu Maschwitz's ProLost blog.

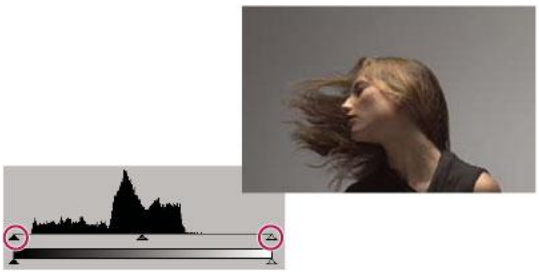
Stu Maschwitz provides a post on his ProLost blog that discusses color correcting for skin tones, with links to some resources about test setups that show various skin tones on a vectorscope.

Mark Christiansen provides tips and detailed techniques for color correction, color adjustment, and color matching in the “Color Correction in Adobe After Effects” chapter of After Effects Studio Techniques on the Peachpit Press website.

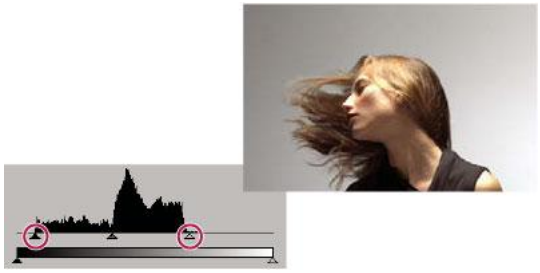
Using histograms to adjust color

A *histogram* is a representation of the number of pixels at each luminance value in an image. A histogram that has nonzero values for each luminance value indicates an image that takes advantage of the full tonal range. A histogram that doesn’t use the full tonal range corresponds to a dull image that lacks contrast.

A common color-correction task is adjusting an image to spread out the pixel values more evenly from left to right on the histogram, instead of having them bunched up at one end or the other. Applying the Levels effect and adjusting its Input White and Input Black properties in the histogram is an easy and effective way to accomplish this task for many images.



Histogram for image that does not use full tonal range



Input sliders moved so that output uses full tonal range

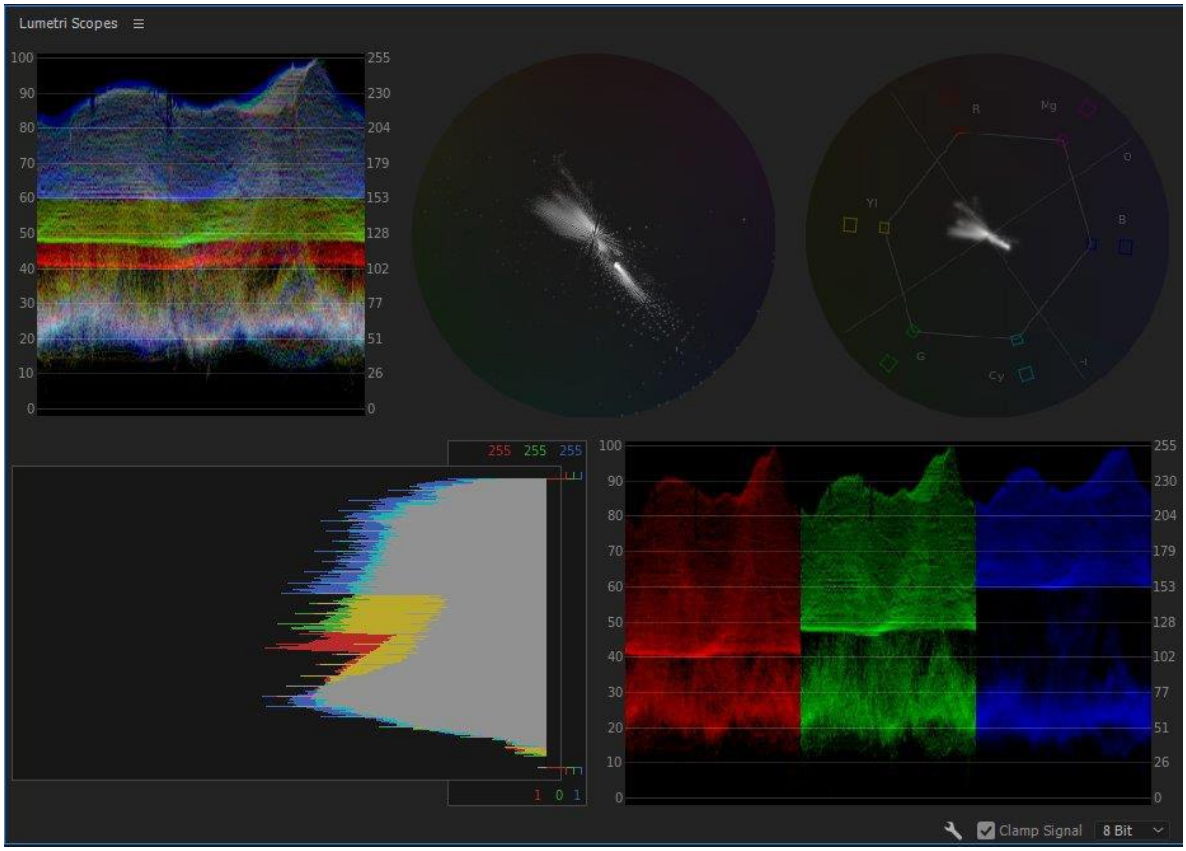
Histogram showing highlight clipping

Histogram showing shadow clipping

Lumetri Scopes panel

Lumetri Scopes panel provides you built-in video scopes to display the color properties of your video. Video scopes include:

- Vectroscopes
- Histograms
- Parade
- Waveform



Video scopes in Lumetri Scopes panel

Each video frame is composed of pixels and each pixel carries color properties, which can be categorized as chrominance, luminance, and saturation. You can evaluate the color properties to color correct your video and ensure consistency between shots.

Lumetri Scopes support for broadcast workflow

Lumteri Scopes panel is designed for broadcast color workflow. The panel measures colors in Rec. 601, Rec. 709, and Rec. 2020 color spaces. To open the colorspaces, right-click the Lumetri Scopes panel and select **Colorspace**.

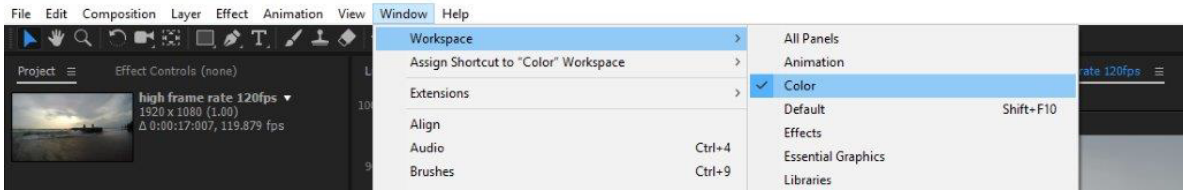
- **Rec. 601:** The color space is used for encoding analog video signals in digital video form.
- **Rec. 709:** The color space is used for HDTV normal workflows.
- **Rec 2020:** The color space is used for HDR and UHDTV (UHD 4k and UHD 8k).

If you have set a different color space for your After Effects project, the scopes represent the appearance of your composition as per your color space, but transformed into the color space (601, 709, or 2020) set in the Lumetri Scopes panel.

For more information on broadcast color workflow, see Color management.

Workspace for working with color tools

A new workspace named Color for working with the Lumetri Scopes panel and the Lumetri Color effect is available within After Effects. To open the workspace, select **Window > Workspace menu**.

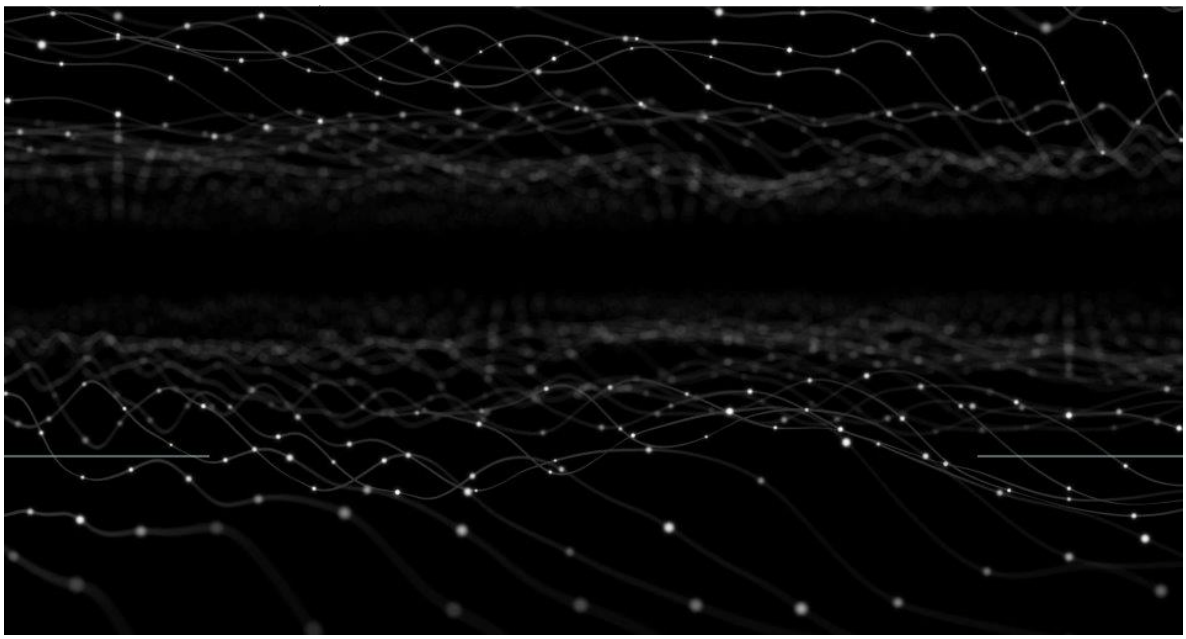


Opening workspace for working with color tools

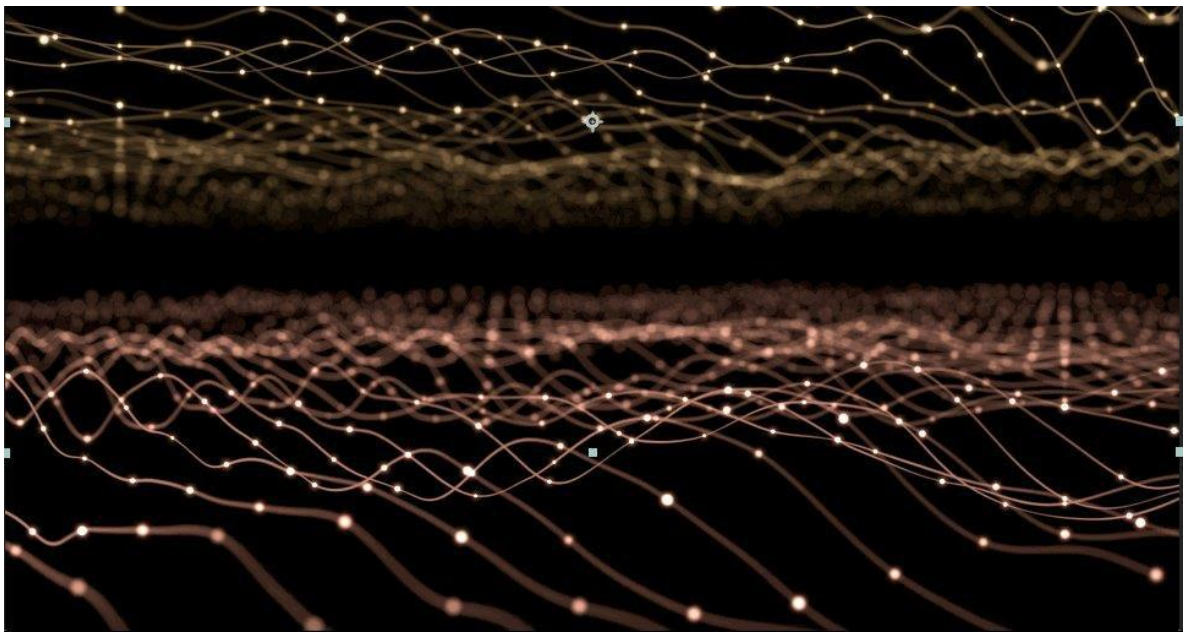
Current viewer panel syncing

Lumetri Scopes panel analyses and displays the changes made in the current viewer panel. It measures color from the current **Composition**, **Layer**, or **Footage** panel. You can change the current viewer to view different results. To lock the Lumetri Scopes display to a specific viewer panel, enable the **Primary Viewer** option in that viewer panel. For example, when you modify the RGB color curves of the composition, the waveform picks up the color and displays the changing color information.

For more information on panels, see Workspaces, panels, and viewers.



Before using Lumetri scopes to read color information



After making changes to the composition as per Lumetri scopes color information

Lumetri Scopes panel in After Effects

Lumetri Scopes panel in After Effects

Lumetri Scopes panel in After Effects is identical to Lumetri Scopes panel in Premiere Pro. For more information on the panel, see Lumetri Scopes in Premiere Pro.

Resources for Synthetic Aperture Color Finesse

The Synthetic Aperture Color Finesse plug-in included with After Effects includes excellent color-correction tools. Synthetic Aperture provides tutorials and additional information about using Color Finesse on their website.

Color Finesse installs its documentation in the plug-in's subfolder in the Plug-ins folder. After Effects includes Synthetic Aperture Color Finesse 3. (See Plug-ins.)

Color models and color spaces

A *color model* is a way of describing color using numbers so that computers can operate on them. The color model used within After Effects is the RGB color model, in which each color is described in terms of amounts of red, green, and blue light added together to make the color. Other color models include CMYK, HSB, YUV, and XYZ.

A *color space* is a variant of a color model. A color space is distinguished by a *gamut* (range of colors), a set of primary colors (*primaries*), a *white point*, and a *tone response*. For example, within the RGB color model are several color spaces, including—in decreasing order of gamut size—ProPhoto RGB, Adobe RGB, sRGB IEC61966-2.1, and Apple RGB. Although each of these color spaces defines color using the same three axes (R, G, and B), their gamuts and tone response curves are different.

Though many devices use red, green, and blue components to record or express color, the components have different characteristics—for example, blue for one camera is not exactly the same as blue for another camera. Each device that records or expresses color has its own color space. When an image moves from one device to another, image colors may look different because each device interprets the RGB values in its own color space.

Color management uses color profiles to convert colors from one color space to another, so colors look the same from one device to another.

Gamma and tone response

The *tone response* for a color space is the relationship of light intensity to the signal that creates or records (perceives) the light.

The human visual system does not respond linearly to light. In other words, our perception of how bright a light is does not double when twice as many photons hit our eyes in a given time. Similarly, the display elements of a CRT monitor do not emit light that is twice as bright when a voltage twice as great is applied. The relationship of light intensity to signal intensity for a display device is expressed by a power function. The exponent of this power function is called *gamma*. In general, the relationship of light intensity to signal intensity for an input device is the inverse of the relationship for an output device, though the gamma values may differ for input and output devices to accommodate the difference between scene lighting and lighting of the viewing environment.

Note:

Moving the midtone slider (such as the Gamma control for the Levels effect) in a color-correction histogram has the same result as modifying gamma, changing the tone response curve without moving the white point. Modifying the curve in the Curves effect also modifies tone response, but not necessarily with a gamma curve.

Charles Poynton provides an excellent set of resources on his website regarding gamma and other color technology.

Linear tone response: when gamma equals 1

Raising any number to the power of 1 gives the original number as a result. A gamma of 1.0 is used to express the behavior of light in the natural world, outside the context of our nonlinear perceptual systems. A system with gamma of 1.0 is sometimes said to operate in *linear light*, whereas a system encoded with a gamma other than 1.0 to match the human visual system is said to be *perceptual*.

If you have enabled color management (by specifying a working color space), you can perform all color operations in linear light by linearizing the working color space. A linearized color space uses the same primaries and white point as the nonlinear version; the tone response curve is just made into a straight line.

Many compositing operations, such as combining colors with blending modes, benefit from being performed in a linear color space. For the most natural and realistic blending of colors, work in a linear color space. If you have not enabled color management, you can still perform blending operations using a gamma of 1.0. (See Linearize working space and enable linear blending.)

System gamma, device gamma, and the difference between scene and viewing environment

The gamma value for an entire system—from capture, through production, to display in the viewing environment—is the product of the gamma values used for each of the phases in the system. This product is not always 1.0, as it would be if the operations performed for encoding exactly matched (inverted) the operations performed for decoding. One reason for a system gamma other than 1.0 is that a difference often exists between the lighting conditions in which a scene is captured and the lighting conditions in which it is viewed. (Consider that you usually watch a movie in a dim environment, but the scenes aren't normally shot in a dim environment.)

For example, the *device gamma* for an HD camera is approximately 1/1.9, and the device gamma for an HD display is approximately 2.2. Multiplying these values gives a *system gamma* of approximately 1.15, which is appropriate for the somewhat dim television viewing conditions of a typical living room. The system gamma for motion picture production is much higher (approximately 1.5–2.5) to accommodate the darker viewing environment of a movie theater. The gamma for the film negative is approximately 1/1.7, and the gamma for the projection film is approximately 3–4.

Color profiles are said to be *scene-referred* if their tone-response curves are based on the conditions in the typical scene. Color profiles are said to be *output-referred* if their tone-response curves are based on the conditions in the typical viewing environment.

By default when you use color management, After Effects automatically adjusts the contrast of images when converting between scene-referred color profiles and output-referred color profiles. This automatic conversion (image state adjustment) is based on the gamma values specified in the HDTV video standard.

- To disable this automatic color transformation, deselect Compensate For Scene-referred Profiles in the Project Settings dialog box (File > Project Settings).

The Compensate For Scene-referred Profiles feature also exists in Adobe Photoshop CS4 and later, but this feature does not exist in other applications. To match the colors in other applications—including After Effects CS3 and earlier—disable this automatic conversion. When you open a project created in After Effects CS3 or earlier, the Compensate For Scene-referred Profiles option is deselected.

Each instance of the Color Profile Converter effect can also be set to either compensate for scene-referred profiles, not compensate for scene-referred profiles, or use the setting indicated by the project's Compensate For Scene-referred Profiles option. (See Color Profile Converter effect.)

For additional information about the compensation for scene-referred profiles, see this blog post by Todd Kopriva and Peter Constable on the Adobe website.

QuickTime and gamma in non-color-managed projects

After Effects 7.0 and earlier used QuickTime codecs to decode several kinds of media, and the gamma adjustments performed by QuickTime on Windows were different from the gamma adjustments performed on Mac OS. The gamma adjustments performed by After Effects CS3 and later differ from the gamma adjustments performed by these QuickTime codecs. Gamma adjustments performed by After Effects CS3 and later on Windows are the same as gamma adjustments performed by After Effects CS3 and later on Mac OS. Also, by not using QuickTime codecs, After Effects preserves over-range values in 32-bpc projects.

Select Match Legacy After Effects QuickTime Gamma Adjustments in the Project Settings dialog box to accomplish any of the following:

- Avoid color shifts when working with projects created in After Effects 7.0 or earlier
- Match the colors in a project created in After Effects 7.0 or earlier
- Ensure that colors in the Composition panel match colors in QuickTime player

The Match Legacy After Effects QuickTime Gamma Adjustments option is selected by default for projects created in After Effects 7.0 or earlier. You should create new projects without this option selected.

Color management

The After Effects color management video provides an introduction to color management explaining how it works and how to use it.

Color management and color profiles

Overview of color management

Color information is communicated using numbers. Because different devices use different methods to record and display color, the same numbers can be interpreted differently and appear to us as different colors. A color management system keeps track of all of these different ways of interpreting color and translates between them so that images can look the same regardless of the device used to display them.

In general, a color profile is a description of a device-specific color space in terms of the transformations required to convert its color information to a device-independent color space.

In the specific case of working within After Effects, ICC color profiles are used to convert to and from the working color space in the following general workflow:

1. An input color profile is used to convert each footage item from its color space into the working color space. A footage item may contain an embedded input color profile, or you can assign the input color profile in the Interpret Footage dialog box or interpretation rules file. (See Interpret a footage item by assigning an input color profile.)
2. After Effects performs all of its color operations in the working color space. You assign a working color space (project working space) in the Project Settings dialog box. (See Choose a working color space and enable color management.)
3. Colors are converted from the working color space to the color space of your computer monitor through the monitor profile. This conversion ensures that your composition will look identical on two different monitors, if the monitors have been properly profiled. This conversion does not change the data within the composition. You can choose whether to convert colors for your monitor using the View > Use Display Color Management menu command. (See Enable or disable display color management.)
4. Optionally, After Effects uses a simulation profile to show you on your computer monitor how the composition will look in its final output form on a different device. You control output simulation for each view through the View > Simulate Output menu. (See Simulate how colors will appear on a different output device.)
5. An output color profile for each output module is used to convert the rendered composition from the working color space to the color space of the output medium. You choose an output color profile in the Output Module Settings dialog box. (See Assign an output color profile.)

By default when you use color management, After Effects automatically adjusts colors to compensate for the differences in gamma between scene-referred color profiles and output-referred color profiles. (See Gamma and tone response.)

Note:

An alternative approach to color management is to manually apply color transformations using color lookup tables (LUTs). (See .)

Benefits of color management

Color management provides many benefits, including the following:

- The colors in imported images appear as the creators of the images intended.
- You have more control over how colors are blended within your project, for everything from motion blur to anti-aliasing.
- The movies that you create will look as you intend when viewed on devices other than your computer monitor.

If you don't enable color management for your project, then the colors in your composition are dependent on the color characteristics of your monitor: the colors that you see are the colors that your monitor displays based on RGB numbers in your footage items. Because different color spaces use the same RGB numbers to represent different colors, the colors that you see and composite may not be the colors that the creator of the footage intended. In fact, the colors may be very far from the intended colors.

By setting a working color space for the project (which enables color management), you do two things:

- You define a common color space for compositing and other color operations.
- You control the appearance of colors in your composition.

If a footage item has an embedded color profile (for example, the footage item is a Photoshop PSD file), then the colors intended by the person who created the image can be accurately reproduced in your composition. The color profile contains the information that determines how to convert the RGB numbers in the image file into a device-independent color space; the color profile of the monitor can then be used to determine which RGB numbers in the color space of your monitor represent the colors intended for the footage item. This automatic conversion becomes even more important as you import footage items with many different color profiles, from many different sources.

The color conversion process takes no effort on your part. The colors simply appear on your monitor just like they appeared when the image was created. Your monitor may have a limited gamut compared to the color space that you choose for the working space, and colors can be clipped when displayed on the monitor. However, you still have the full range of color data in your project, and the colors are not clipped internally.

When you are ready to output your composition, you can use color management to transform your colors into the space appropriate for your output media. At this stage, you are preserving the appearance of colors as you intend them to look.

Color profiles

The file format for color profiles is standardized by the ICC (International Color Consortium), and the files that contain them usually end with the .icc filename extension. After Effects comes with a large number of color profiles for color spaces for common (and some not so common) input and output types.

After Effects loads color profiles from multiple locations, including the following:

- Mac OS: Library/ColorSync/Profiles
- Mac OS: Library/Application Support/Adobe/Color/Profiles
- Windows: WINDOWS\system32\spool\drivers\color
- Windows: Program Files\Common Files\Adobe\Color\Profiles

You can create a custom ICC profile using Adobe Photoshop. In Photoshop, choose Edit > Color Settings. The RGB and CMYK menus in the Working Spaces area of the Photoshop Color Settings dialog box include options for saving and loading ICC profiles and defining custom profiles.

All color profiles used in a project are saved in the project, so you do not need to manually transfer color profiles from one system to another to open the project on another system.

Note:

The NTSC (1953) color profile corresponds to obsolete television equipment and should not be used. For standard-definition NTSC television, use one of the SDTV NTSC color profiles.

When you choose a profile—for input, output, or simulation—the motion-picture film profiles do not appear unless your footage is Cineon footage or you select Show All Available profiles. If your footage is Cineon footage, only the motion-picture film profiles appear, unless you select Show All Available Profiles.

Color management tips

Be sure to read the helpful text in the Interpret Footage, Project Settings, and Output Module Settings dialog boxes. This text helps you to understand the color conversions that will be done as you interpret footage, composite, and output rendered movies.

Make sure that your work environment provides a consistent light level and color temperature. For example, the color characteristics of sunlight change throughout the day, which can alter the way colors appear on your screen, so keep shades closed or work in a windowless room.

Online resources about color management

Trish and Chris Meyer provide an overview of color management in an article on the Artbeats website.

Johan Steen provides a detailed article on his website that explains color management in After Effects. The article also describes how to calibrate and profile a monitor, how to use color management in Photoshop, and how to work in a linear color space.

For information on color profiles, see the International Color Consortium website.

Calibrate and profile your monitor

When you calibrate your monitor, the profiling utility lets you save a color profile that describes the color behavior of the monitor. This profile contains information about what colors can be reproduced on the monitor and how the color values in an image must be converted so that colors are displayed accurately. After Effects and your operating system can use this information to ensure that the colors that you see on your monitor look like the colors in the output movies that you create.

Note:

Monitor performance changes and declines over time; recalibrate and profile your monitor every month or so. If you find it difficult or impossible to calibrate your monitor to a standard, it may be too old and faded.

1. Make sure that your monitor has been turned on for at least half an hour, giving it sufficient time to warm up and produce more consistent output.
2. Make sure that your monitor is displaying millions of colors (24 bits per pixel) or higher.
3. If you do not have profiling software that uses a hardware measuring device, remove colorful background patterns on your monitor desktop and set your desktop to display neutral grays. Busy patterns or bright colors surrounding a document interfere with accurate color perception.
4. Do one of the following to calibrate and profile your monitor:
   - For best results, use third-party software and measuring devices. In general, using a measuring device such as a colorimeter along with software can create more accurate profiles because an instrument can measure the colors displayed on a monitor far more accurately than the human eye can.

     Most profiling software automatically assigns the new profile as the default monitor profile. For instructions on how to manually assign the monitor profile, see the documentation for your operating system.
   - In Mac OS, use the Calibrate utility, located in the System Preferences > Displays > Color tab.

Choose a working color space and enable color management

You turn color management on for a project by choosing a working color space (Working Space) for the project in the Project Settings dialog box. You control color management for each footage item with the Interpret Footage dialog box or interpretation rules file. You control color management for each output item in the Output Module Settings dialog box.

If Working Space is set to None in the Project Settings dialog box, color management is off for the project.

Choosing a working color space is an essential step in managing color in a project. Colors of footage items are converted into the working color space as a common color space for compositing.

For best results, when working with 8-bpc color, match the working color space to the output color space. If you are rendering to more than one output color space, you should set the project color depth to 16 bpc or 32 bpc, at least for rendering for final output. The working color space should match the output color space that has the largest gamut. For example, if you plan to output to Adobe RGB and sRGB, then use Adobe RGB as your working color space, because Adobe RGB has a larger gamut and can therefore represent more saturated colors. To preserve over-range values, work in 32-bpc color for its high dynamic range.

Suggestions for working color space choices:

- SDTV NTSC or SDTV PAL is a good choice if you're making a movie for standard-definition broadcast television, including standard-definition DVD.
- HDTV (Rec. 709) is a good choice if you're making a movie for high-definition television. This color space uses the same primaries as sRGB, but it has a larger gamut, so it makes a good working space for many kinds of work.
- ProPhoto RGB with a linear tone response curve (gamma of 1.0) is a good choice for digital cinema work.
- sRGB IEC61966-2.1 is a good choice if you're making a movie for the Web, especially cartoons.

The color spaces available in After Effects vary based on the color profiles installed on your computer. (See Color profiles.)

1. Choose File > Project Settings.
2. Choose a working color space from the Working Space menu.

Color management and Mercury Transmit

The color values sent to the video monitor are from the working color space for the project. To preview video colors, choose a value for Working Space in the Project Settings dialog box that matches the color space of the preview device.

Video previews sent to an external monitor using Mercury Transmit is color managed. See the Preview on an external video monitorsection for details.

To manage colors in a dynamically linked composition or for video previews, create a new composition and nest your composition within it; then apply the Color Profile Converter effect to the nested composition, with Input Profile set to Project Working Space. For video previews, then set Output Profile to match the color space of the video preview device. (See Color Profile Converter effect.)

Color management and Dynamic Link

When color management is enabled for an After Effects project, compositions viewed over **Dynamic Link** are transformed using the Rec. 709 color profile. This prevents color or gamma shifts in the appearance of these compositions in Premiere Pro and Adobe Media Encoder.

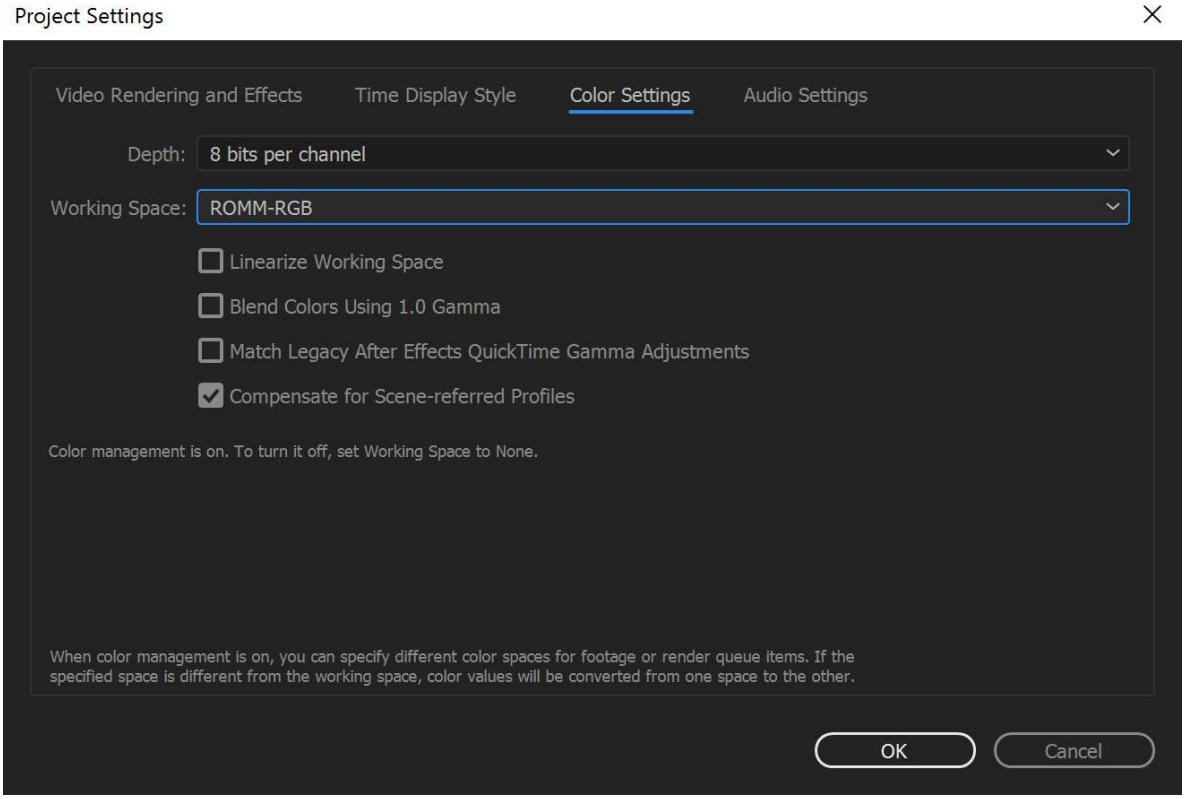
Dynamic Link always assumes that all incoming frames are in Rec. 709. A color transformation is applied to the composition as a last step before the images are passed to Dynamic Link for use in Premiere Pro or Adobe Media Encoder. This corrects the composition image to the color space used by Dynamic Link, similar to how the **View** > **Enable Display Color Management** option in After Effects corrects the image for your monitor.

Export color profiles to Adobe Media Encoder

Adobe Media Encoder can embed color profiles in JPEG files rendered from an After Effects composition.

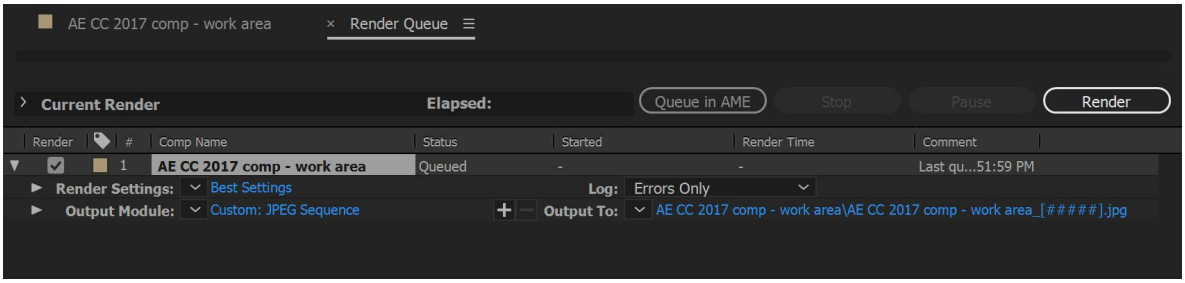
To ember color profiles, follow these steps:

1. Enable color management by specifying a color working space profile in the Project settings. To open Project settings, select **Edit** > **Project Settings**.
2. In the **Project Settings** dialog, click **Working Space** and choose a color working space from the drop-down list.


Project Settings
Video Rendering and Effects
Time Display Style
Color Settings
Audio Settings
Depth:
8 bits per channel
Working Space:
ROMM-RGB
Linearize Working Space
Blend Colors Using 1.0 Gamma
Match Legacy After Effects QuickTime Gamma Adjustments
Compensate for Scene-referred Profiles
Color management is on. To turn it off, set Working Space to None.
When color management is on, you can specify different color spaces for footage or render queue items. If the specified space is different from the working space, color values will be converted from one space to the other.
OK
Cancel

Selecting color working space

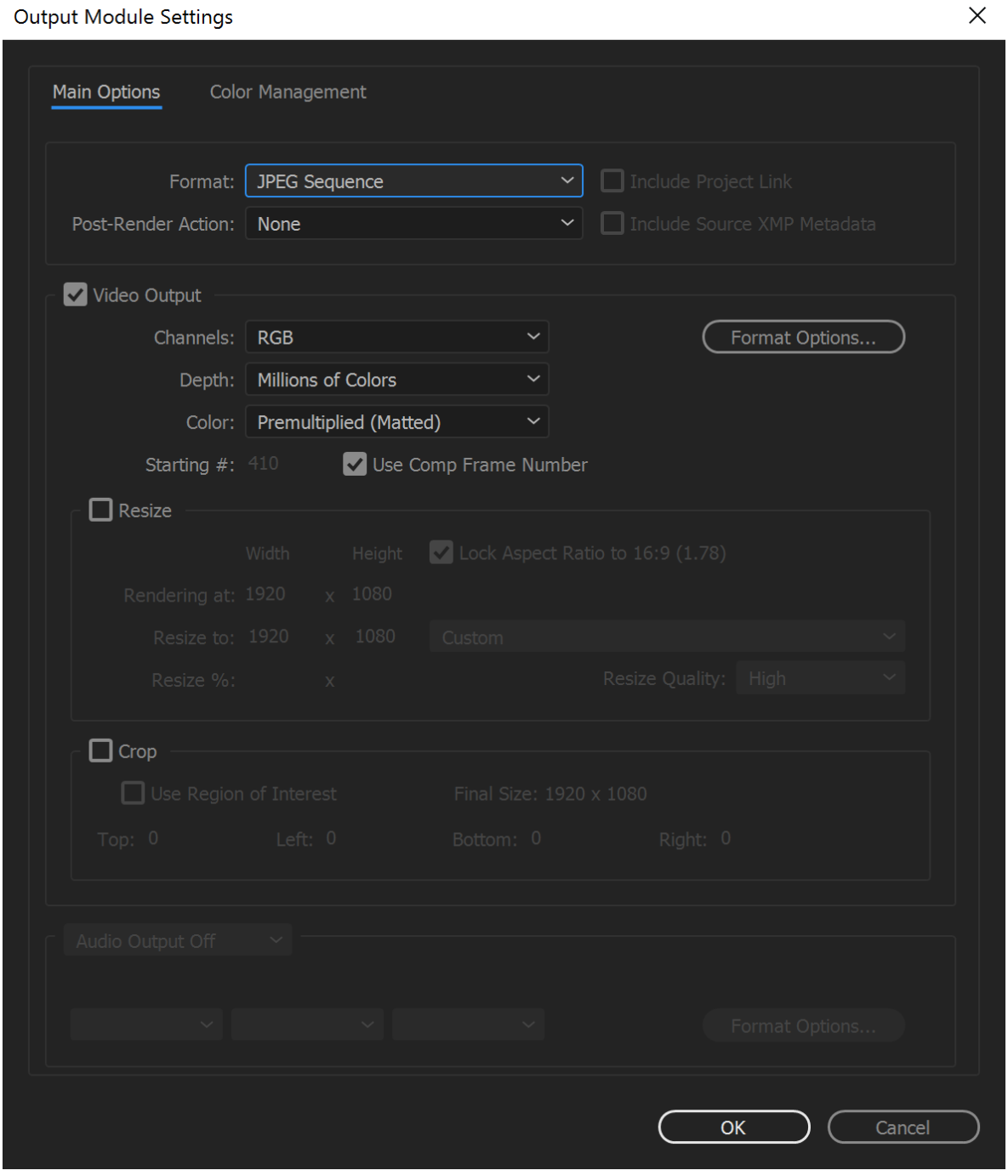
3. After you specify a color working space, add your composition to the **Render Queue**. To add your composition, select **File** > **Export** > **Add to Render Queue**.



Adding to Render Queue

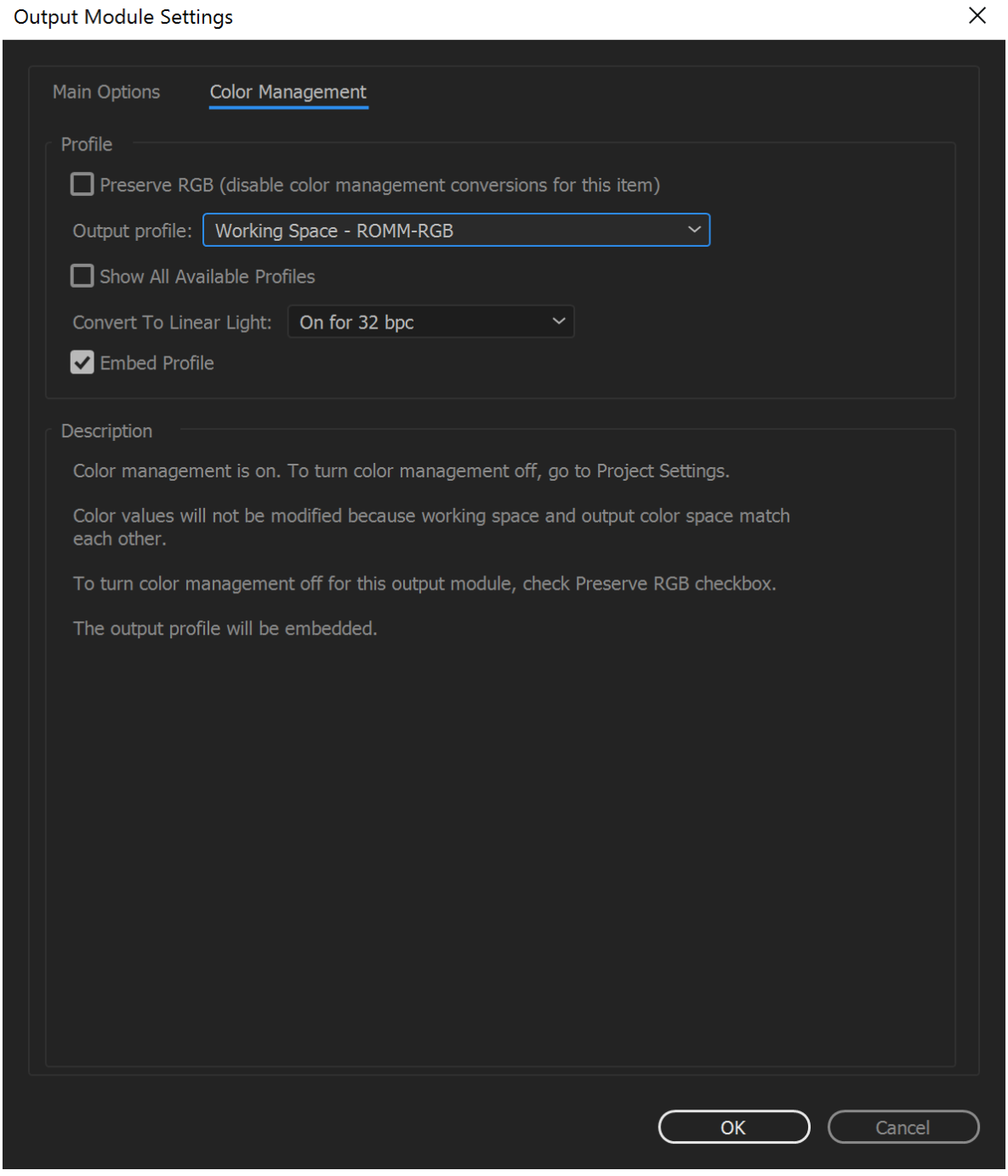
4 In the Render Queue panel, click **Output Module Settings**.

5 In the **Output Module Settings** dialog, click Main Options and change the **Format** to **JPEG**.



Changing format to JPEG

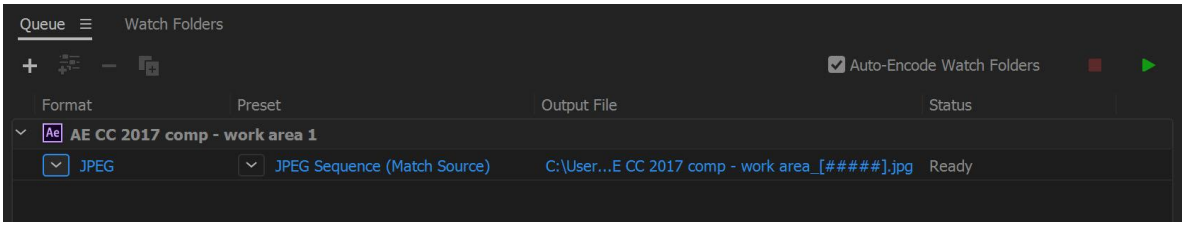
6 After you set the format, click **Color Management** and choose the **Output Profile** and enable the **Embed Profile** option.


Output Module Settings
Main Options
Color Management
Profile
Preserve RGB (disable color management conversions for this item)
Output profile:
Working Space - ROMM-RGB
Show All Available Profiles
Convert To Linear Light:
On for 32 bpc
Embed Profile
Description
Color management is on. To turn color management off, go to Project Settings.
Color values will not be modified because working space and output color space match each other.
To turn color management off for this output module, check Preserve RGB checkbox.
The output profile will be embedded.
OK
Cancel

Embedding color profile

7 In the **Render Queue** panel, click the **Queue In AME** button

8 The composition launched in Adobe Media Encoder. In Adobe Media Encoder, set the **Output Format** to JPEG.



Setting the output format to JPEG

Note:

*If the **Embed Profile** option is not enabled, Adobe Media Encoder embeds the HDTV (Rec. 709) profile.*

Linearize working space and enable linear blending

If you have enabled color management (by specifying a working color space), you can perform all color operations in linear light by linearizing the working color space. A linearized color space uses the same primaries and white point as the nonlinear version; the tone response curve for the linearized color space is just a straight line. (See Gamma and tone response.)

If you have not enabled color management, you can still perform blending operations using a gamma of 1.0.

By performing operations in a linear color space, you can prevent certain edge and halo artifacts, such as the fringing that appears when high-contrast, saturated colors are blended together. Many color operations benefit from working in a linear color space, including those operations involved in image resampling, blending between layers with blending modes, motion blur, and anti-aliasing.

If you want to use a linearized working color space, do so when you set up the project, instead of switching later. Otherwise, colors chosen in the color picker will change when you switch to a linear working color space, because colors inside After Effects are interpreted to be in the working color space.

Note:

A linearized working color space works best with higher color depths—16 bpc and 32 bpc—and is not recommended for 8-bpc color.

? Choose File > Project Settings, and do one of the following:

- To linearize the working color space, choose Linearize Working Space.
- To blend colors in a linear color space, choose Blend Colors Using 1.0 Gamma. This option affects only blending between layers. The result is that opacity fades, motion blur, and other features that rely on blending modes are affected.

Additional resources about linear color spaces and linear blending

Stu Maschwitz's ProLost blog has several posts that are useful for learning about how, when, and why to work in a linear color space versus a non-linear color space. In this post, Stu summarizes the reasons and techniques for working in a linear color space and using linear blending.

Interpret a footage item by assigning an input color profile

You control color management for each footage item using the Interpret Footage dialog box.

The input color profile determines what calculations are performed when converting the colors of a footage item into the working color space for the project. If a working space has not been set—that is, if color management is not on for the project—then you cannot assign an input color profile.

In some cases, files that you import have ICC profiles embedded in them. When you import these files, you can be confident that the colors that you see are as the producer of the footage originally intended. After Effects can read and write embedded color profiles for Photoshop (PSD), TIFF, PNG, and JPEG files.

If a footage item does not have an embedded color profile, you can assign an input color profile using the Interpret Footage dialog box or by adding or modifying a rule in the interpretation rules file (interpretation rules.txt). After Effects interprets the footage item as if the source footage was created using this color profile, so be certain to assign a profile that matches (or at least approximates) that used to create the source footage.

Note:

If a source footage item was created by an application that doesn't use color management—such as a movie rendered from a 3D application—the input color profile is essentially the monitor profile of the system on which the image was designed and created.

1. Select a footage item in the Project panel.
2. Choose File > Interpret Footage > Main.
3. In the Color Management tab of the Interpret Footage dialog box, choose a value from the Assign Profile menu.

   If you don't see the profile that you want in the Assign Profile menu, select Show All Available Profiles.
4. Read the information in the Description area of the dialog box to confirm that the conversion is the one that you want, and click OK.

Non-RGB footage items (such as CMYK, Y'CbCr, and camera raw images) cannot be assigned an input profile. Their native color space is displayed in the Interpret Footage dialog box. Conversion of non-RGB color values to RGB color values is handled automatically for each format.

If you don't assign an input color profile, and After Effects doesn't have a rule in the interpretation rules file with which to make an interpretation, the colors of the footage item are assumed to be in the working color space of the project.

When color management is enabled, the input color profile for a footage item is shown in the information area at the top of the Project panel.

The Interpret As Linear Light option determines whether the assigned input color profile is interpreted as being linear (gamma equals 1.0). This option also works when color management is turned off for the project. (See Gamma and tone response.)

You can prevent the conversion of colors into the working color space for a single footage item by selecting Preserve RGB in the Color Management tab of the Interpret Footage dialog box. This option preserves RGB numbers; color appearance is not preserved. Turning off color management for a specific footage item is useful when the footage item is not intended for visual display, but is instead intended for use as a control layer—for example, a displacement map.

Assign an output color profile

You control color management for each output item using the Output Module Settings dialog box.

Note:

When you export to SWF format, you use the Export menu, not the Render Queue panel, so the output module settings are not available for this output type. If color management is enabled for the project, After Effects automatically converts colors from the working color space of the project to the sRGB IEC61966-2.1 color space when exporting to SWF.

The output color profile for a render item determines what calculations are performed when converting the colors of a rendered composition from the working color space of the project to the color space for the output medium. If a project working space has not been set—that is, if color management is not on for the project—then you cannot assign an output color profile.

For example, after creating a movie in an HDTV (Rec. 709) working color space for output to film, you likely want to output to a log-encoded Cineon/DPX color space using a film output color profile. If, on the other hand, you're creating a movie for high-definition television, you should choose an HDTV (Rec. 709) output profile.

The output color profile for a render item is part of an output module and is displayed in the output module group in the Render Queue panel. You can assign multiple output modules to one render item, each with its own output color profile, allowing you to create output movies for various media from one rendered movie.

The Convert To Linear Light option determines whether the colors are output to a linear color profile (gamma equals 1.0). It is seldom a good idea to output to linear light for 8-bpc or 16-bpc color, so the default setting for Convert To Linear Light is On For 32 bpc. (See Gamma and tone response.)

Some file formats—such as Photoshop (PSD), PNG, TIFF, and JPEG—allow for the embedding of a color profile. If you embed a color profile in an output file, then you can be more certain that programs that use the file will correctly interpret its color information.

After Effects chooses a rendering intent based on the output color profile that you choose. For most output types, the rendering intent is relative colorimetric (with black point compensation); for output to film negative, the rendering intent is absolute colorimetric.

You can prevent the conversion of colors from the working color space for a single output item by selecting Preserve RGB in the Color Management tab of the Output Module Settings dialog box. This option preserves RGB numbers; color appearance is not preserved. Turning off color management for a specific footage item is useful when the footage item is not intended for visual display, but is instead intended for use as a control layer—for example, a displacement map.

1. Click the underlined text next to the Output Module heading for the render item in the Render Queue panel.
2. In the Color Management tab of the Output Module Settings dialog box, choose a value from the Output Profile menu.

   If you don't see the profile that you want in the Output Profile menu, select Show All Available Profiles. This option shows the motion-picture film color profiles.
3. Read the information in the Description area of the dialog box to confirm that the conversion is the one that you want, and click OK.

Enable or disable display color management

When color management is on, the default behavior is for RGB pixel values to be converted to the color space of your computer monitor from the working color space for the project. Color appearance is preserved; RGB numbers are not preserved. This behavior is adequate for most uses, but you sometimes need to see how the colors are actually going to look when viewed through a system that does not use color management. For example, you may need to see how the colors will appear when viewed in a web browser.

When display color management is off, the RGB color values are sent directly to your monitor, without any conversion through the monitor profile. RGB numbers are preserved; color appearance is not preserved.

When display color management is on for a viewer, a yellow plus sign appears in the Show Channel And Color Management Settings button at the bottom of the viewer.

For each viewer (Composition, Layer, or Footage panel), you can choose whether to manage display colors, which involves the conversion of colors from the working color space to the color space of the monitor.

1 Activate a Composition, Layer, or Footage panel.

2 Do one of the following to toggle between enabling and disabling display color management:

- Click the Show Channel And Color Management Settings button at the bottom of the viewer, and choose Use Display Color Management.
- Choose View > Use Display Color Management.
- Press Shift+/ (on the numeric keypad).

Output simulation settings (including No Output Simulation) are remembered.

Simulate how colors will appear on a different output device

Often, you need to preview how a movie will appear on a device other than your computer monitor. One purpose of color management is to ensure that colors look the same on every device, but color management in After Effects can't overcome scenarios like the following:

- An output device for which you're creating your movie has a smaller gamut than the working color space of your project, so the device is unable to represent some colors.
- The colors in your movie are displayed by a device or software that does not use color management to convert colors.

For example, when you are creating a movie using a computer monitor and a high-definition video monitor, you may need to see how the movie will look when transferred to a specific film stock and projected under standard theater viewing conditions.

In such situations, you'll want to preview how colors will appear when they're displayed on a device other than your computer monitor. Output simulation requires display color management.

During output simulation, colors are converted from the working color space for the project to the color space of the monitor through the following flow:

1. Colors are converted from working color space for the project to output color space. Colors are converted from the working color space to the color space of the output type using the output color profile (the same profile that will be used for rendering to final output).

2. Colors are converted from output color space to color space of simulated playback device. If Preserve RGB is not selected, colors are converted from the output color space to the color space of the presentation medium using the simulation profile. This setting presumes that the simulated device also performs color management and will convert colors for display. Color appearance is preserved; RGB numbers are not preserved.

If Preserve RGB is selected, the color values are not converted in this step. Instead, the numeric RGB color values are preserved and are re-interpreted to be in the color space of the simulated device. One use of this simulation is to see how a movie will look when played back on a device other than the one for which it was intended or a device that does not perform color management.

Note:

Use Preserve RGB when simulating the combination of a capture film stock and a print film stock.

3. Colors are converted from color space of simulated playback device to color space of your monitor. Colors are converted from the presentation device color space to the color space of your computer monitor using the monitor profile.

When you create an output simulation preset, you can choose a profile to use for each of these steps.

Even if you're using a preset output simulation, you can choose the Custom option in the View > Simulate Output menu after selecting the preset to see a representation of which color conversions and reinterpretations are occurring for that simulation type.

Output simulation applies only to a specific viewer (Composition, Layer, or Footage panel) and works only for previews. Color conversions for output simulation are performed when values are sent to the display. Actual color numbers in the project are not changed.

As with all color space conversions, simulating output decreases performance somewhat, so you may not want to simulate output when performing tasks that require real-time interaction.

Note:

Merely applying the correct profiles can't compensate for different color gamuts for different devices. For example, common LCD monitors for personal computers do not have the gamut necessary to fully simulate HDTV output.

You can press Shift+/ (on the numeric keypad) to turn display color management on or off. Turning display color management off also turns off output simulation. Simulation settings (including No Output Simulation) are remembered when display color management is off.

Simulate output for previews

1. Activate a Composition, Layer, or Footage panel.
2. Choose View > Simulate Output, and choose an output type to simulate.

   Note:

   Output simulation relies on display color management, which is on by default. If display color management is off, choose View > Use Display Color Management.

   No Output Simulation Display color management is on, but no conversion is performed to simulate an output type.

   Legacy Macintosh RGB (Gamma 1.8) Show how colors will appear when displayed by a non–color managed application on a Macintosh computer with a gamma of 1.8—the value used by Mac OS before Mac OS X 10.6. This option is not available if Linearize Working Space is selected.

   Internet Standard RGB (sRGB) Show how colors will appear when displayed by a non–color managed application with a gamma of 2.2. This option is not available if Linearize Working Space is selected.

   Kodak 5218 To Kodak 2383 Show how colors will appear when output to the Kodak 5218 negative film stock and then projected from Kodak 2383 positive film stock in a theater environment.

   Note:

   The DPX Theater Preview and DPX Standard Camera profiles provided by After Effects 7.0 for use with the Proof Colors command have been replaced by the Kodak 2383 and Kodak 5218 profiles used with the Simulate Output command.

   Custom If you don't see an entry for the output type that you want to simulate, you can create your own output simulation preset by choosing Custom. You can specify a profile to use for each of the conversion or reinterpretation steps.

   - To preview how a movie will look if you output the movie to a device and view it on that device, use the same value for Output Profile and Simulation Profile.

- To preview how a movie will look if you output the movie to one device and then view it on another, color-managed device, use different values for Output Profile and Simulation Profile, and deselect Preserve RGB.
- To preview how a movie will look if you output the movie to one device and view it on another device, use different values for Output Profile and Simulation Profile, and select Preserve RGB.

You can choose an output simulation preset for each view. Custom output simulation settings are shared between all views.

To toggle between no output simulation and the most recently used output simulation, click the Show Channel And Color Management Settings button at the bottom of the viewer and choose Simulate Output.

Simulate an output type in a movie rendered for final output

Color management for output simulation is only for previews, but you can render a movie with a look that simulates a particular output type. For example, you can render a movie for HDTV that simulates a film appearance, which is especially useful for creating dailies when doing film work.

1. Choose Layer > New > Adjustment Layer to create a new adjustment layer at the top of your composition.
2. Choose Effect > Utility > Color Profile Converter to apply the Color Profile Converter to the adjustment layer.
3. Choose Edit > Duplicate to duplicate the effect.
4. In the Effect Controls panel, set the following options for the first instance of the effect:

   Input Profile Project Working Space

   Output Profile The type of output to simulate; for example, a film printing density profile, such as Kodak 5218/7218 Printing Density

   Intent Absolute Colorimetric

5. In the Effect Controls panel, set the following options for the second instance of the effect:

   Input Profile The type of playback to simulate; for example, a theater preview profile

   Output Profile The color space of the output medium; for example HDTV (Rec. 709)

   Intent Relative Colorimetric

To enable and disable this type of output simulation, you can turn the adjustment layer on and off by selecting and deselecting its Video switch in the Timeline panel.

Broadcast-safe colors

Analog video signal amplitude is expressed in IRE units (or volts in PAL video). Values between 7.5 and 100 IRE units are considered *broadcast-safe*; colors in this range do not cause undesired artifacts such as audio noise and color smearing. (In practice, some spikes over 100 IRE are legal, but for simplicity 100 IRE is considered the legal maximum here.) This range of 7.5-100 IRE is equivalent to a range from black to white of 64-940 in 10-bpc values for Y' in Y'CbCr, which corresponds to 16-235 in 8-bpc values. Therefore, many common video devices and software systems interpret 16 as black and 235 as white, instead of 0 and 255. These numbers don't directly correspond to RGB values.

If you notice that colors of imported footage look wrong—blacks don't look black enough, and whites don't look white enough—make sure that you've assigned the correct input color profile. The common video color profiles included with After Effects include variants that account for these limited ranges, such as the HDTV (Rec. 709) 16-235 color profile, which interprets 16 as black and 235 as white.

Note:

Some video cards and encoders assume that output is in the range 0-255, so limiting colors in your composition and rendered movie may be redundant and lead to an undesired compression of the color range. If colors of your output movie look dull, try assigning an output color profile that uses the full range of colors.

If colors look washed out, apply the Levels effect and look at the histogram to see if the lowest and highest color values are at or near 16 and 235. If so, then this footage should be interpreted using one of the 16-235 input color profiles.

You can use the Broadcast Colors effect to reduce luminance or saturation to a safe level, but the best way to limit output colors to the broadcast-safe range is to create your composition to not use colors out of this range. (See .)

Keep in mind the following guidelines:

- Avoid pure black and pure white values.
- Avoid using highly saturated colors.
- Render a test movie and play it on a video monitor to ensure that colors are represented accurately.

Rather than using the Broadcast Colors effect to reduce the luminance or saturation of colors, you can use this effect with the Key Out Unsafe or Key Out Safe option. Apply the effect to an adjustment layer at the top of the layer stack to show which parts of the image are outside the broadcast-safe range.

The Color Finesse plug-in included with After Effects includes excellent tools that can help you keep your colors within the broadcast-safe range. For more information, see the Color Finesse documentation in the folder containing the Color Finesse plug-in. (See Color correction, color grading, and color adjustment.)

Note:

After Effects 7.0 had an Expand ITU-R 601 Luma Levels option in the Interpret Footage dialog box. When opened in After Effects CS3 or later, footage items in projects created with this option are assigned a corresponding profile.

Creative Cloud Libraries in After Effects

Creative Cloud Libraries makes your assets available to you anywhere. Create images, colors, text styles, color looks, and more in Photoshop, Illustrator, and mobile apps like Adobe Shape, and then easily access them across other desktop and mobile apps for a seamless creative workflow.

To learn more, see Creative Cloud Libraries.

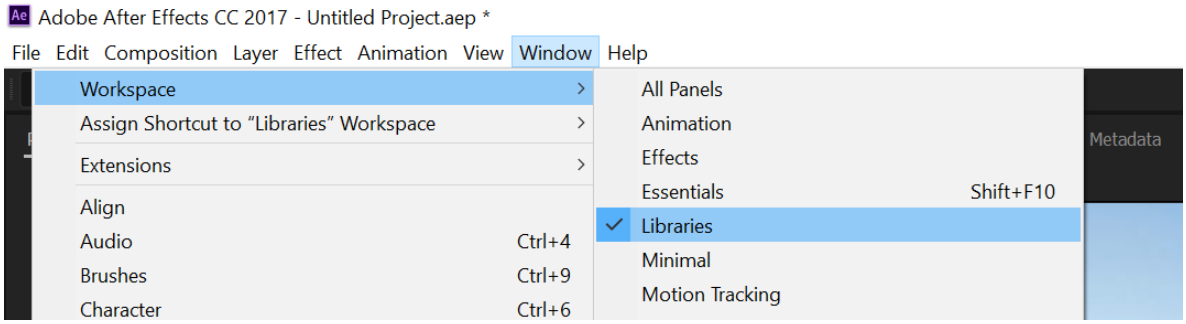
Using Creative Cloud Libraries

In After Effects, Creative Cloud Libraries are available from within the Libraries panel and the Start screen. The Libraries panel is visible in the **Default** workspace, **Standard** workspace, and **All Panel** workspace. It is docked on the right side of the workspace.

To open the Libraries panel, select either:

- **Window > Workspace > Libraries**

- **File > Import** OR
- **Window > Libraries**



Opening Libraries panel

You can use the creative assets in After Effects in many different ways:

- You can drag graphics assets from the Libraries panel to the Project panel to import them into your project.
- Vector assets in your library that were created with mobile apps like Capture can be imported into After Effects and converted into shape layers for high-quality vector animations.
- Text layer graphics added to your library from Photoshop can be imported into After Effects and converted to editable text layers with live layer styles.

Note:

Asset types other than graphics that are in your library cannot be directly applied, but they can be viewed and managed in the Libraries panel. You can also use the Eyedropper tool in After Effects to pick from your library colors, similar to the Adobe Color Themes panel.

Location of Library assets

Library assets imported into After Effects are copied to your user folder at the following locations:

- **Mac OS X**: Users/<user_name>/Documents/Adobe/After Effects CC 2015/User Libraries/
- **Windows**: C:\Users\<user_name>\Documents\Adobe\After Effects CC 2015\User Libraries\

Accessing Creative Cloud Libraries

You can access libraries in the following ways:

Across projects Whatever you save in the Libraries panel becomes available for use across After Effects projects that you are working on.

Across computers Libraries are synced to Creative Cloud. Your Library becomes available on any computer that you are signed into using your Creative Cloud with your Adobe ID.

Across apps Whatever you save in the Libraries panel becomes automatically available across desktop and mobile apps that support Creative Cloud Libraries.

For example, you can access Libraries from desktop apps such as Adobe Premiere Pro or Photoshop, and mobile apps such as Adobe Capture.

To learn more about how to access Creative Cloud Libraries, see Access your assets anywhere.

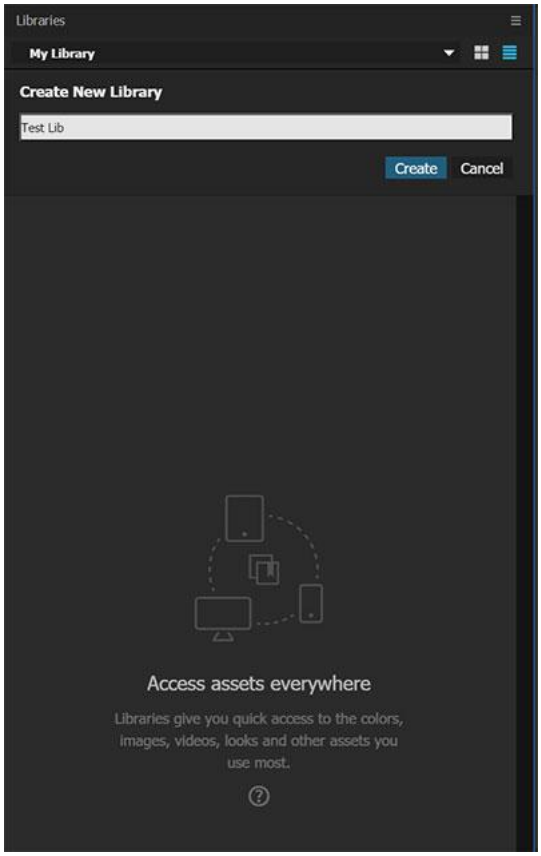
Add a Creative Cloud library

You can create any number of libraries to organize your assets. The libraries that you create are displayed in the Libraries panel in After Effects.

To create a library, do the following:

1 Click the drop-down in the Libraries panel, and select **Create New Library**.

2 Type a name for the library, and click **Create**.



Adding Creative Cloud Library

Read more about adding assets to Creative Cloud Libraries.

Add assets to a Creative Cloud Library

To add assets to a Creative Cloud Library, follow any of the options mentioned:

Option 1:

1 Drag your assets to the Library panel.

2 The asset is added to your selected library. These libraries are synced with your Creative Cloud accounts and you can access them from anywhere.

Option 2:

In After Effects, select **File > Save As** or **File > Save** and save the files in Creative Cloud Files directory.

You can store all your assets in the Create Cloud Library directory, which is synced with your Creative Cloud account. The Creative Cloud desktop application creates the directory by default.

Option 3:

To open the Creative Cloud Files directory from Creative Cloud desktop app, do one of the following depending on your version of the app:

a) Launch Creative Cloud desktop app.

b) Click the cloud icon in the upper-right corner.

c) Click **Open sync folder**.

a) Launch Creative Cloud desktop app.

b) Select **Files.**

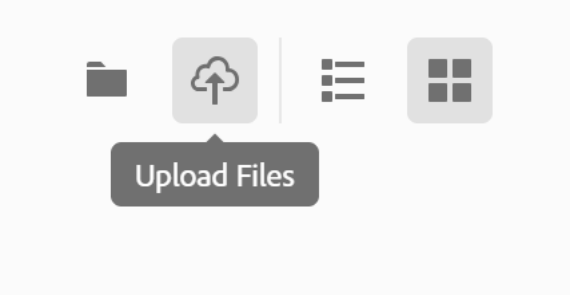
c) Click **Open Folder**.

For more information, see adding assets to Creative Cloud Libraries.

You can also add assets directly to the Creative Cloud Assets page. To add assets:

1 Go to https://assets.adobe.com/files.

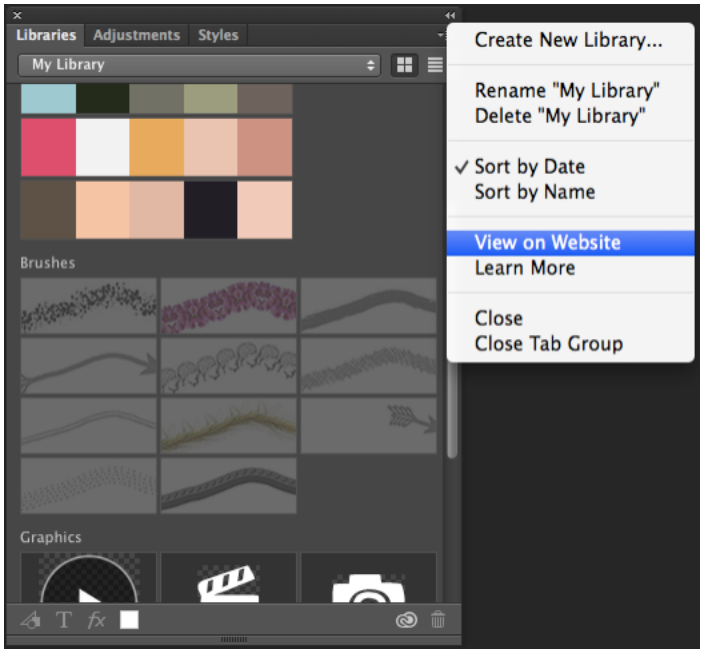
2 Click Upload Files icon to upload your files.



Once uploaded, the files are synced with your Creative Cloud account, and you can access them from anywhere.

Use assets in a library

Graphic Assets



Adding Photoshop effects to Creative Cloud Library

Graphics assets can be imported into your After Effects project, like any other asset you would import from your local disks. To import graphics assets into your project, do either of the following:

- Right-click a graphic asset and choose **Import**.

OR

- Select a graphic asset in the Libraries panel, and drag it to the Project panel.

Vector graphics in your library that were created with Illustrator or Shape can be imported into After Effects. After adding them to a composition, these graphics can then be converted into shape layers for high-quality vector animations.

Photoshop text layer graphics added to your library can be imported into After Effects, and can be converted to editable text layers with live layer styles.

Changing the **Drag Import Multiple Items As** setting in **Preferences** > **Import** affects how PSD and AI assets are imported from a library.

For more information, see Access from Photoshop and Illustrator.

Looks

Looks are color presets created and added to Creative Cloud library using Adobe Premiere Pro (CC 2015 and later versions). Looks combine color and light information from a live image captured by your mobile device camera or a photograph in your device.

Looks, stored in .look files can then be applied to a layer in After Effects. Looks are an easy way to enhance your project by modifying the image's color or to apply color grading, usually done using another application like SpeedGrade or the color panel in Premiere Pro.

Looks from the Libraries panel are read using the Apply Color LUT effect, the same as LUT files from other sources.

To apply a look from the Libraries panel, do any of the following:

- Select a layer in the composition, right-click on a look in the Libraries panel, and choose Apply Look.
- Drag a look from the Libraries panel onto a layer in the Composition, Layer, Effect Controls, or Timeline panels.
- Drag a look from the Libraries panel onto the title row of an existing Apply Color LUT effect on a layer in the Timeline or Effect Controls panels. After Effects will add the Apply Color LUT effect to the target layer and apply the look. If the Apply Color LUT effect is already present on a layer, applying a look from the Libraries panel reuses the existing instance of the effect. You can use this approach to tryout different looks on the same layer.

Add assets from Adobe Stock

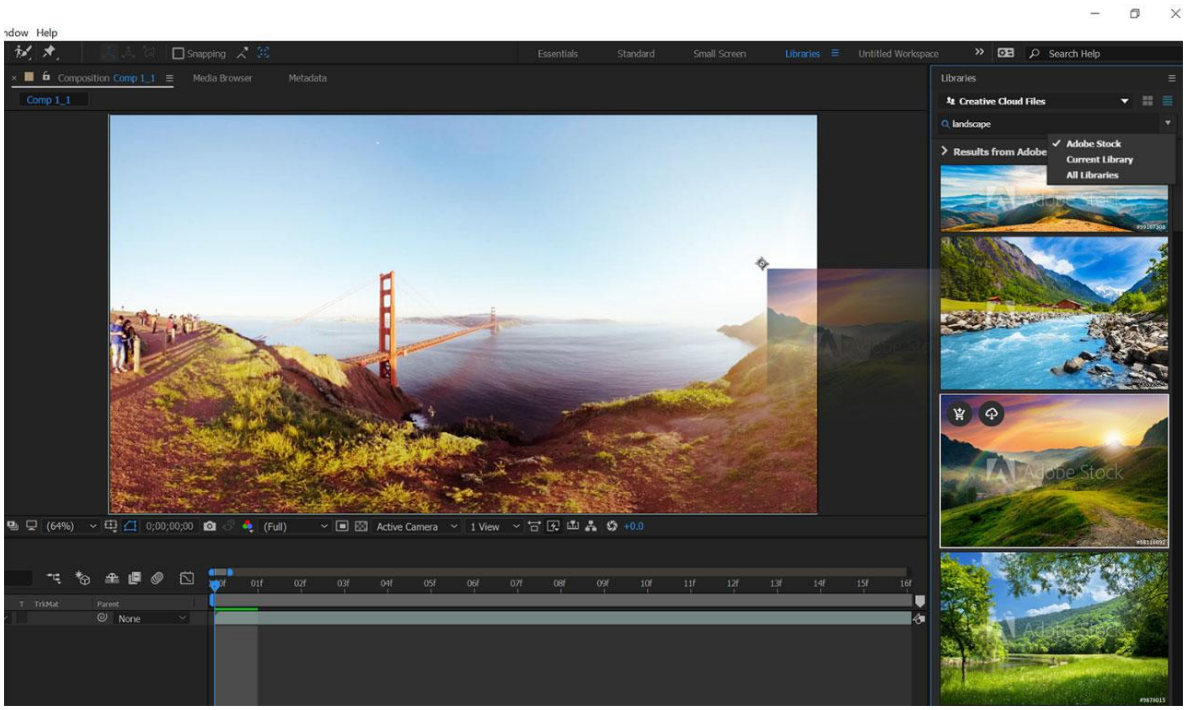
Adobe Stock is a service that sells millions of high-quality, royalty-free photos, illustrations, and videos (including HD and 4K videos).

You can start a search of Adobe Stock assets from within After Effects:

1. Select **Window** > **Library** to open the Library panel in After Effects.
2. Click the **Search Adobe Stock** button at the bottom of the Libraries panel.
3. In the page that is displayed, search the Stock library for the asset you want to use.

The search results for video assets display the licensing status, duration, and format information. You can filter your search results and preview the assets. Click Results From Adobe Stock to limit search results to photos, illustrations, vectors, or video. You can choose 4K or HD versions when you purchase or try a preview of a 4K video via the Libraries panel.

Once you locate an asset that you want to use, you can purchase a license immediately and add the asset to your Library, which will then appear in the Libraries panel within After Effects. Or, you can add an unlicensed preview (watermarked) version of the asset to your Library. To license a Stock asset from the Project panel, select a watermarked preview asset in the Project panel, and choose **File** > **License** or click the shopping cart button to the left of an unlicensed footage item.



Adding assets from Adobe Stock from the Library panel

If you add a preview version of an asset to your Library, you can license it later. To license the asset, click/right-click it, and from the context menu select "License this image".

Adobe Stock still image preview assets are automatically replaced with the full-resolution, non-watermarked version when you purchase a license.

Add assets from Essential Graphics panel

You can share Motion Graphics templates through Creative Cloud libraries. Ensure that you have the latest version of Creative Cloud desktop app installed on your computer.

You can check for app available updates in Creative Cloud desktop app. All the Motion Graphics templates are displayed as updates in the desktop app.

You can check for updates manually by following these steps:

1. Click the Creative Cloud desktop icon in the taskbar (Windows) or Apple menu bar (macOS), to open Creative Cloud desktop app.
2. In your profile menu, click **Sign out**.
3. Sign in again using your Adobe ID (usually your email) and password or use your social (Facebook or Google) account to sign in to your Adobe account.
4. If you aren't using the latest version of Creative Cloud desktop app, a prompt to update will appear. Click **Update**.

Share libraries with Creative Cloud users

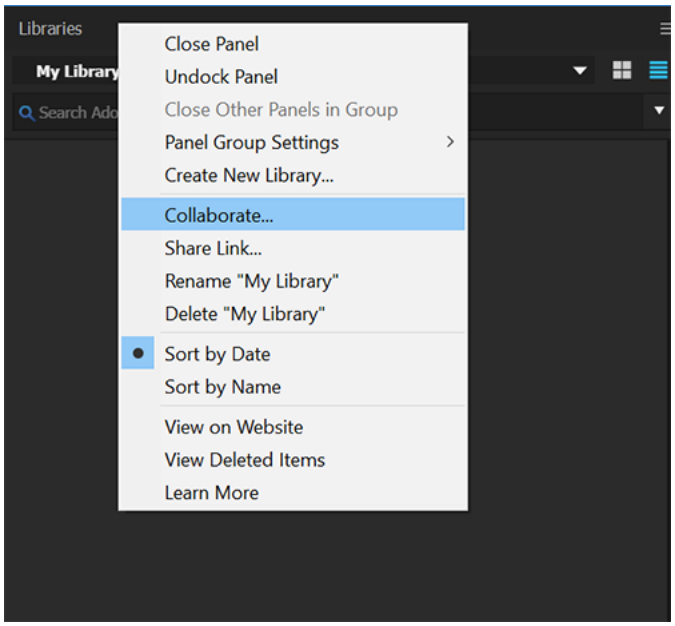
You can share your libraries with other Creative Cloud users to view, edit, or use the contents of a shared library. The users of your library assets are informed whenever a read-only asset is changed in the library.

If a Creative Cloud subscriber has shared a library with you, you can further share it with other Creative Cloud users.

Share a library: There are two ways you can share your libraries with other users:

Option 1:

In the Libraries panel, click the pop-up menu on the panel tab, and choose **Collaborate**.



Sharing and collaborating libraries from Library panel

Option 2:

1. To share libraries using the Creative Cloud website, go to Your Work section of the Creative Cloud website.
2. In the side navigation, click **Libraries**. The libraries owned by you can be found under the **Owned by You** tab.
3. Select the library that you want to share, and click **Share**. Follow the onscreen instructions to invite collaborators to your library.

Join a shared library:

Follow these steps to join a shared library:

1. Launch the Adobe Creative Cloud desktop app and log in with your Adobe ID credentials.
2. When a library is shared with you, you receive a notification. Click the bell icon to access your notifications.
3. Click **Accept** for each library collaboration invitation.

For more information, see Sharing and collaborating Creative Cloud Libraries.

Chapter 9: Drawing, painting, and paths

Paint tools: Brush, Clone Stamp, and Eraser

Paint tools and paint strokes

The Brush tool , Clone Stamp tool , and Eraser tool are all paint tools. You use each in the Layer panel to apply paint strokes to a layer. Each paint tool applies brush marks that modify the color or transparency of an area of a layer without modifying the layer source.

Each paint stroke has its own duration bar, Stroke Options properties, and Transform properties, which you can see and modify in the Timeline panel. Each paint stroke is, by default, named for the tool that created it, with a number that indicates the order in which it was drawn.

At any time after you draw a paint stroke, you can modify and animate each of its properties using the same techniques that you use to modify the properties and duration of a layer. You can copy paint stroke path properties to and from properties for mask paths, shape layer paths, and motion paths. For even more power and flexibility, you can link these properties using expressions. (See Creating shapes and masks and Add, edit, and remove expressions.)

Note:

To specify settings for a paint stroke before you apply it, use the Paint and Brushes panels. To change and animate properties for a paint stroke after you've applied it, work with properties of the stroke in the Timeline panel.

Individual brush marks are distributed along each paint stroke—though the marks may appear to merge together to form a continuous stroke with the default settings. Brush settings for each brush in the Brushes panel determine the shape, spacing, and other properties of brush marks; you can also modify these Stroke Options properties for each stroke in the Timeline panel.

In After Effects, paint strokes are vector objects, which means that they can be scaled up without loss of quality. Paint strokes in some applications, such as Photoshop, are raster objects. (See About vector graphics and raster images.)

Groups of paint strokes appear in the Timeline panel as instances of the Paint effect. Each instance of the Paint effect has a Paint On Transparent option. If you select this option, the layer source image and all effects that precede this instance of the Paint effect in the effect stacking order are ignored; the paint strokes are applied on a transparent layer.

For some painting, drawing, cloning, and retouching tasks, you may want to take advantage of the sophisticated paint tools provided by Adobe Photoshop. See Working with Photoshop and After Effects.

Note:

The Roto Brush tool shares some features with the paint tools, and you can work with Roto Brush strokes in many of the same ways as paint strokes. For information about the Roto Brush tool and Roto Brush strokes, see Roto Brush strokes, spans, and base frames.

Common operations for paint tools and strokes

- To show paint strokes on selected layers in the Timeline panel, press PP.
- To select paint strokes in the Layer panel, use the Selection tool to click a paint stroke or drag a box around portions of multiple paint strokes.

To momentarily activate the Selection tool, press and hold V.

- To show only selected paint strokes in the Timeline panel, select paint strokes and press SS.
- To rename a paint stroke, select the paint stroke in the Timeline panel and press Enter on the main keyboard (Windows) or Return (Mac OS); or right-click (Windows) or Control-click (Mac OS) the name and choose Rename.
- To reorder paint strokes within an instance of the Paint effect, drag a Paint stroke to a new location in the stacking order in the Timeline panel.
- To reorder an instance of the Paint effect to interleave it with other effects, drag the effect to a new location in the stacking order in the Timeline panel.
- To target a specific instance of the Paint effect for the addition of new paint strokes, choose from the View menu at the bottom of the Layer panel.
- To hide a paint stroke from view (and from rendered output), deselect the Video switch for the paint stroke.
- To open or close the Paint panel and Brushes panel when a paint tool is selected, click the Toggle The Paint Panels button .

Common paint tool settings in the Paint panel

To use the Paint panel, first select a paint tool from the Tools panel.

Opacity For Brush and Clone strokes, the maximum amount of paint applied. For Eraser strokes, the maximum amount of paint and layer color removed.

Flow For Brush and Clone strokes, how quickly paint is applied. For Eraser strokes, how quickly paint and layer color are removed.

Mode How pixels in the underlying image are blended with the pixels painted on by the Brush or Clone stroke. (See Blending mode reference.)

Channels Which channels of the layer the Brush stroke or Clone stroke affect. When you choose Alpha, the stroke only affects opacity, so swatches are grayscale. Painting the alpha channel with pure black has the same result as using the Eraser tool.

Duration The duration of the paint stroke. Constant applies the stroke from the current frame to the end of the duration of the layer. Single Frame applies the stroke to the current frame only. Custom applies the stroke to the specified number of frames, beginning with the current frame. Write On applies the stroke from the current frame to the end of the duration of the layer and animates the End property of the stroke to match the motion with which the stroke was drawn..

When you have a paint tool active, you can press 1 or 2 (on the main keyboard) to move the current-time indicator forward or backward the number of frames specified by the Duration setting in the Paint panel.

Brushes and the Brushes panel tools

To use the Brushes panel, first select a paint tool from the Tools panel.

Choose a brush gallery display mode

? Choose a display mode from the Brushes panel menu: Text Only, Small Thumbnail, Large Thumbnail, Small List, or Large List.

Create and manage preset brushes

- To create a new preset brush, specify the desired settings in the Brushes panel, and then choose New Brush from the Brushes panel menu or click the Save Current Settings As New Brush button .
- To rename a preset brush, select the brush and choose Rename Brush from the panel menu.
- To delete a preset brush, choose Delete Brush from the panel menu or click the Delete Brush button .
- To restore the default set of preset brushes, choose Reset Brush Tips from the Brushes panel menu. To retain the custom brushes you created, click Append when the dialog box prompts you to replace current brushes with the default brushes.

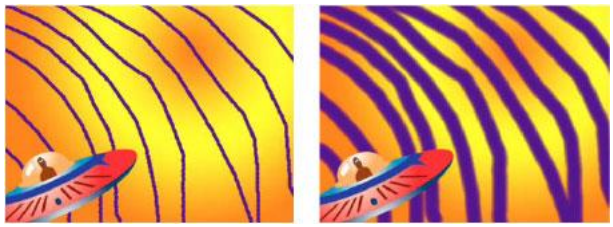
Note:

Preset brushes are saved in the preferences file, so they persist between projects.

Brush properties

Ctrl-drag (Windows) or Command-drag (Mac OS) the brush in the Layer panel to adjust Diameter; release the key and continue to drag to adjust Hardness.

Diameter Controls the size of the brush.



Strokes with low Diameter values (left) and high Diameter values (right)

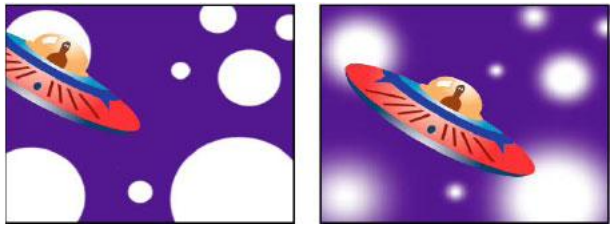
Angle The angle by which the long axis of an elliptical brush is rotated from horizontal.

***note**: Brush angles can be expressed in both positive and negative values. For example, a brush with a 45º angle is equivalent to a brush with a -135º angle.*

Roundness The ratio between the short and long axes of a brush. A value of 100% indicates a circular brush, a value of 0% indicates a linear brush, and intermediate values indicate elliptical brushes.

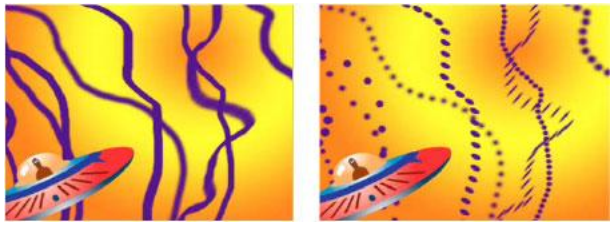
Brush strokes using 100% roundness (left) and varying percentages (right)

Hardness Controls the transition of a brush stroke from 100% opaque at the center to 100% transparent at the edges. Even with high Hardness settings, only the center is fully opaque.



Hardness settings at 100% (left) and 0% hardness (right)

Spacing The distance between the brush marks in a stroke, measured as a percentage of the brush diameter. When this option is deselected, the speed at which you drag to create the stroke determines the spacing.



Decrease spacing for continuous strokes (left); increase spacing for dashed strokes (right).

Brush Dynamics These settings determine how the features of a pressure-sensitive digitizing tablet—such as a Wacom pen tablet—control and affect brush marks. For each brush, you can choose Pen Pressure, Pen Tilt, or Stylus Wheel for Size, Angle, Roundness, Opacity, and Flow to indicate what features of the pen tablet you would like to use to control brush marks. For example, you can vary the thickness of brush marks by setting Size to Pen Pressure and pressing more firmly when drawing some portions of the stroke. If Size is not set to Off, Minimum Size specifies the size of the thinnest brush mark.

Paint with the Brush tool

Use the Brush tool to paint on a layer in the Layer panel with the current foreground color.

Note:

To specify settings for a paint stroke before you apply it, use the Paint and Brushes panels. To change and animate properties for a paint stroke after you've applied it, work with the properties of the stroke in the Timeline panel.

Select a color for the Brush tool

Do any of the following with the Brush tool active:

- To select a foreground color with the Color Picker, click the Set Foreground Color button in the Paint panel.
- To select a foreground color from anywhere on the screen with the eyedropper, select the eyedropper in the Paint panel and then click to sample the color under the pointer. Ctrl-click (Windows) or Command-click (Mac OS) to sample the average color of a 3-pixel by 3-pixel square.

You can quickly activate the eyedropper for use within the Layer panel by pressing Alt (Windows) or Option (Mac OS) when the pointer is in the Layer panel.

- To switch the foreground color with the background color, press X or click the Switch Foreground And Background Colors button .
- To reset the foreground color and background color to black and white, press D.

Note:

To change or animate the color of a brush stroke after painting, use the Color property in the Stroke Options group in the Timeline panel.

Paint with the Brush tool

1. Select the Brush tool .
2. Choose settings and a brush in the Paint panel and Brushes panel.
3. In the Layer panel, drag with the Brush tool to paint on the layer.

   Each time you release the mouse button, you stop drawing a stroke. When you drag again, you create a new stroke. Shift-drag to resume drawing the previous stroke.

Paint on individual frames with the Brush tool

You can paint on individual frames over a series of frames to create an animation or to obscure unwanted details in your footage.

If your output will be interlaced, double the frame rate of your composition before painting on individual frames. (See Frame rate.)

1. Select the Brush tool.
2. In the Paint panel, choose Custom from the Duration menu, and specify the duration in frames. To paint on each frame, set the Duration value to 1. Set other options in the Paint panel and Brushes panel as desired.
3. In the Layer panel, drag with the Brush tool to paint on the layer.

   Each time you release the mouse button, you stop drawing a stroke. When you drag again, you create a new stroke. Shift-drag to resume drawing the previous stroke.
4. Press 2 on the main keyboard to advance the number of frames specified by the Custom duration setting, and then repeat the previous step.

   Note:

   To move back the Custom number of frames, press 1 on the main keyboard.

If you use a pen tablet, map the keyboard shortcuts to the buttons on your pen to work more efficiently. See the documentation for your pen tablet for instructions.

Clone Stamp tool

You can use the Clone Stamp tool to copy pixel values from one place and time and apply them at another place and time. For example, you can use the Clone Stamp tool to remove wires by copying from a clear patch of sky, or you can create a herd of cows from one cow in the source footage and offset the copies in time.

The Clone Stamp tool samples the pixels from a source layer and applies the sampled pixel values to a target layer; the target layer can be the same layer or a different layer in the same composition. If the source layer and target layer are the same, the Clone Stamp tool samples paint strokes and effects in the source layer, in addition to the layer source image.

Use the Clone Stamp tool

As with all paint tools, you use the Clone Stamp tool in the Layer panel.

If the source layer and target layer are different layers, open each layer in a different viewer. Press Ctrl+Alt+Shift+N (Windows) or Command+Option+Shift+N (Mac OS) to split and lock the current viewer.

You can identify what result a stroke will have before you make it by using the clone source overlay, a semi-transparent image of the source layer.

Note:

To specify settings for a paint stroke before you apply it, use the Paint and Brushes panels. To change and animate properties for a paint stroke after you've applied it, work with the properties of the stroke in the Timeline panel.

Select Aligned in the Paint panel to make the position of the sample point (Clone Position) change for subsequent strokes to match the movement of the Clone Stamp tool in the target Layer panel. In other words, with the Aligned option selected, you can use multiple strokes to paint on one copy of the sampled pixels. In contrast, deselecting the Aligned option causes the sample point to stay the same between strokes, meaning that you begin painting on pixels from the original sample point each time you drag again to create a new clone stroke.

For example, select Aligned to use multiple clone strokes to copy one whole cow—which would be difficult to do in one continuous stroke—and deselect Aligned to copy one flower into dozens of places in the target layer to make a field of flowers, using one clone stroke per copy.

Select Lock Source Time to clone a single source frame (at composition time Source Time); deselect Lock Source Time to clone subsequent frames, with a time offset (Source Time Shift) between the source frame and the target frame. The clone source time automatically loops back to the starting sample point when the current sampling point goes beyond the end of the duration of the source layer. This looping is especially helpful when you have a lot of frames to repair in the target layer but only a few good frames in the source layer.

1. Open a composition that contains both the source layer and the target layer.
2. Open the source layer in a Layer panel and move the current-time indicator to the frame from which to begin sampling.

   Note:

You can manually manipulate the time and coordinates from which sampling begins by modifying the Offset, Source Time Shift, Source Position, or Source Time values in the Paint panel. You can reset them to zero with the Reset button.

3. Alt-click (Windows) or Option-click (Mac OS) with the Clone Stamp tool on the source layer in the Layer panel to set the sampling point.
4. Open the target layer in a Layer panel and move the current-time indicator to the frame at which to begin painting the clone stroke.
5. Drag in the target layer to paint on cloned pixel values from the source layer. To help you identify what the Clone Stamp tool is sampling as you apply clone strokes, a crosshair identifies the point being sampled.

   Each time you release the mouse button, you stop drawing a stroke. When you drag again, you create a new stroke. Shift-drag to resume drawing the previous stroke.

Click the Difference Mode button next to the Clone Source Overlay option in the Paint panel or modify the opacity of the overlay to help you better line up elements and see the results of your clone strokes. To temporarily show the clone source overlay, press Alt+Shift (Windows) or Option+Shift (Mac OS). Alt+Shift-drag (Windows) or Option+Shift-drag (Mac OS) to change the position of the source layer.

Each clone stroke includes properties in the Timeline panel that are unique to the Clone Stamp tool and correspond to settings made in the Paint panel before the clone stroke is created:

Clone Source The sampled layer.

Clone Position The (x,y) location of the sample point within the source layer.

Clone Time The composition time at which the source layer is sampled. This property appears only when Lock Source Time is selected.

Clone Time Shift The time offset between the sampled frame and the target frame. This property appears only when Lock Source Time is not selected.

After clone strokes have been created, their properties in the Timeline panel can be modified and animated. For example, you can clone a bird flying across the screen by cloning it in one frame, tracking the motion of the bird, and then linking the Clone Position property to the Attach Point property of tracker with an expression.

You can set a blending mode for clone strokes, just as for other paint strokes. For example, consider using the Darken blending mode to remove light-colored scratches, and using the Lighten blending mode to remove dark-colored blemishes and dust.

Work with clone presets

Use clone presets to save and reuse clone source settings: Source Layer, Aligned, Lock Source Time, Source Time Shift, Offset, and Source Position values. Clone presets are saved in the preferences file, so they can be reused in other projects. To work with clone presets, first select the Clone Stamp tool.

- To select a clone preset, press 3, 4, 5, 6, or 7 on the main keyboard, or click a Clone Preset button in the Paint panel.
- To modify a clone preset, select it and adjust the Clone Options settings as desired.

- To copy the settings from one clone preset to another, select the clone preset from which to copy, and Alt-click (Windows) or Option-click (Mac OS) the Clone Preset button for the clone preset to which you want to paste the settings.

Eraser tool

If you use the Eraser tool in Layer Source & Paint or Paint Only mode, it creates Eraser strokes that can be modified and animated. In contrast, using the Eraser tool in Last Stroke Only mode only affects the last paint stroke drawn and does not create an Eraser stroke.

To temporarily use the Eraser tool in Last Stroke Only mode, Ctrl+Shift-drag (Windows) or Command+Shift-drag (Mac OS).

1. Select the Eraser tool from the Tools panel.
2. Choose settings in the Paint panel.
3. Select a brush in the Brushes panel, and set brush options.
4. Drag through the area you want to erase in the Layer panel.

   Each time you release the mouse button, you stop drawing a stroke. When you drag again, you create a new stroke. Shift-drag to resume drawing the previous stroke.

Note:

If you use a pen tablet, pressing the eraser side of the pen to the tablet temporarily activates the Eraser tool.

Animate and edit paint strokes

You animate a paint stroke by setting keyframes or expressions for its properties. After Effects animates paint stroke properties—even the Path property of a paint stroke—by interpolating values for all frames between keyframes.

By modifying and animating the Start and End properties of a paint stroke, you can control how much of a stroke is shown at any time. For example, by automatically animating the End property from 0% to 100% with the Write On setting, you can make a paint stroke appear to be drawn on over time.

As with all properties, you can link paint stroke properties to other properties using expressions. For example, you can make a paint stroke follow a moving element in your footage by tracking the moving element and then linking the Position property of the paint stroke to the Attach Point property of the tracker.

Rotoscoping is a special case of painting or drawing on individual frames in which some item in the frame is being traced. Often, rotoscoping refers to drawing animated masks rather than paint strokes. (See Rotoscoping introduction and resources.)

Scott Squires provides a pair of movies on his Effects Corner website that show how to rotoscope, both painting and masking:

- Rotoscoping - Part 1
- Rotoscoping - Part 2

Animate a paint stroke by sketching with Write On

If you choose Write On from the Duration menu in the Paint panel, the End property is automatically animated to match the motion that you used to draw the stroke.

Note:

After Effects also includes a Write-on effect. (See .)

1. Select a paint tool in the Tools panel.
2. In the Paint panel, choose Write On from the Duration menu.
3. Drag in the Layer panel to apply a paint stroke to the layer.

   As you paint, your movements are recorded in real time and determine the rate at which the resulting stroke is drawn to the screen for output. Recording begins when you click within the layer in Layer panel. When you release the mouse button, the current time returns to the time at which you started painting; this behavior is so that you can record more paint strokes for animated playback starting from the same time.

You can animate the Trim Paths operation on a shape path to accomplish a similar result as animating a paint stroke with Write On. (See Alter shapes with path operations.)

Animate a paint stroke path

1. Select a paint tool in the Tools panel.
2. In the Paint panel, choose Single Frame, Constant, or Custom from the Duration menu.
3. In the Layer panel, drag to create a paint stroke.
4. Using the Selection tool, select the paint stroke.

   To momentarily activate the Selection tool, press and hold V.
5. Press SS to show the selected paint stroke in the Timeline panel.
6. Click the triangle next to the paint stroke name to expand its list of properties.
7. Click the stopwatch for the Path property to create an initial Path keyframe.
8. Drag the current-time indicator to another time.
9. While the stroke is still selected, drag in the Layer panel using a paint tool to create a paint stroke. A second Path keyframe appears in the Timeline panel.

   By creating a stroke while a stroke is selected, you replace the selected stroke, which is sometimes referred to as *stroke targeting*.

   If you are not satisfied with the way that the path is interpolated, consider creating your path as a mask, using Smart Mask Interpolation to fine-tune the interpolation, and then copying the Mask Path property keyframes to the paint stroke Path property. (See Animate a mask path with Smart Mask Interpolation.)

After Effects interpolates a paint stroke (center) between two different shapes created with the same brush (left and right).

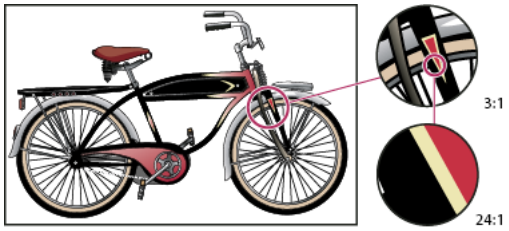
Overview of shape layers, paths, and vector graphics

About vector graphics and raster images

Vector graphics are made up of lines and curves defined by mathematical objects called *vectors*, which describe an image according to its geometric characteristics. Examples of vector graphics elements within After Effects include mask paths, shapes on shape layers, and text on text layers.

Raster images (sometimes called *bitmap images*) use a rectangular grid of picture elements (pixels) to represent images. Each pixel is assigned a specific location and color value. Video footage, image sequences transferred from film, and many other types of images imported into After Effects are raster images.

Vector graphics maintain crisp edges and lose no detail when resized, because they are resolution-independent. This resolution-independence makes vector graphics a good choice for visual elements, such as logos, that will be used at various sizes.



Example of a vector graphic at different levels of magnification

Raster images each consist of a fixed number of pixels, and are therefore resolution-dependent. Raster images can lose detail and appear jagged (*pixelated*) if they are scaled up.

Example of a raster image at different levels of magnification

Some images are created as vector graphics in another application but are converted to pixels (*rasterized*) when they are imported into After Effects. If a layer is continuously rasterized, After Effects reconverts the vector graphics to pixels when the layer is resized, preserving sharp edges. Vector graphics from SWF, PDF, EPS, and Illustrator files can be continuously rasterized.

Aharon Rabinowitz's "What are Raster and Vector Graphics?" video tutorial—part of the Multimedia 101 series on the Creative COW website—provides a general introduction to raster images and vector graphics.

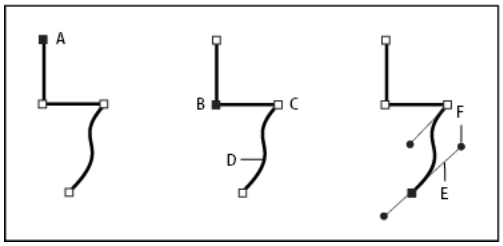
About paths

Several features of After Effects—including masks, shapes, paint strokes, and motion paths—rely on the concept of a *path*. Tools and techniques for creating and editing these various kinds of paths overlap, but each kind of path has its own unique aspects.

A path consists of *segments* and *vertices*. Segments are the lines or curves that connect vertices. Vertices define where each segment of a path starts and ends. Some Adobe applications use the terms *anchor point* and *path point* to refer to a vertex.

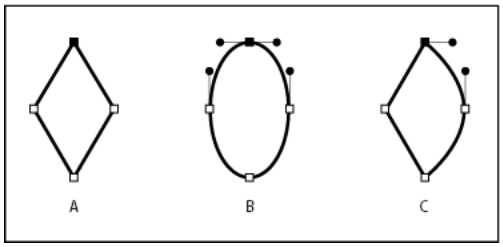
You change the shape of a path by dragging its vertices, the *direction handles* at the end of the *direction lines* (or *tangents*) of each vertex, or the path segment itself.

As a path exits a vertex, the angle and length of the outgoing direction line for that vertex determine the path. As the path approaches the next vertex, the path is less influenced by the outgoing direction line of the previous vertex and more influenced by the incoming direction line of the next vertex.



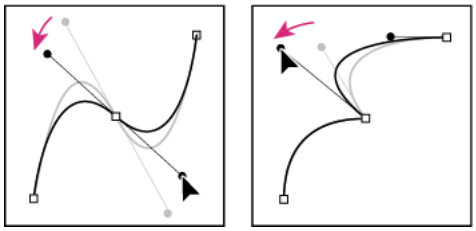
Components of a path
***A** Selected vertex **B** Selected vertex **C** Unselected vertex **D** Curved path segment **E** Direction line (tangent) **F** Direction handle*

Paths can have two kinds of vertices: corner points and smooth points. At a *smooth point*, path segments are connected as a smooth curve; the incoming and outgoing direction lines are on the same line. At a *corner point*, a path abruptly changes direction; the incoming and outgoing direction lines are on different lines. You can draw a path using any combination of corner and smooth points. If you draw the wrong kind of point, you can change it later.



Points on a path
***A** Four corner points **B** Four smooth points **C** Combination of corner and smooth points*

When you move a direction line for a smooth point, the curves on both sides of the point adjust simultaneously. By contrast, when you move a direction line on a corner point, only the curve on the same side of the point as the direction line is adjusted.



Adjusting the direction lines on a smooth point (left) and a corner point (right)

A path can either be open or closed. An open path has a beginning point that is not the same as its end point; for example, a straight line is an open path. A closed path is continuous and has no beginning or end; for example, a circle is a closed path.

You can draw paths in common geometric shapes—including polygons, ellipses, and stars—with the shape tools, or you can use the Pen tool to draw an arbitrary path. Paths drawn with the Pen tool are either manual Bezier paths or RotoBezier paths. The main difference between RotoBezier and manual Bezier paths is that direction lines are calculated automatically for RotoBezier paths, making them easier and faster to draw.

When you use the shape tools (Rectangle, Rounded Rectangle, Ellipse, Polygon, or Star) to draw a shape path on a shape layer, you can create one of two kinds of paths: a parametric shape path or a Bezier shape path. (See About shapes and shape layers.)

You can link mask paths, paint stroke paths, and Bezier shape paths using expressions. You can also copy and paste between mask paths, paint stroke paths, Bezier shape paths, motion paths, and paths from Adobe Illustrator, Photoshop, and Adobe Fireworks. (See Creating shapes and masks.)

For shape paths, you can use the Merge Paths path operation (similar to the Pathfinder effects in Adobe Illustrator) to combine multiple paths into one path. (See Merge Paths options.)

When you want text or an effect to follow a path, the path must be a mask path.

A path itself has no visual appearance in rendered output; it is essentially a collection of information about how to place or modify other visual elements. To make a path visible, you apply a stroke to it. In the case of a mask path, you can apply the Stroke effect. In the case of a path for a shape layer object, the default is for a path to be created with a stroke property group (attribute) after the path property group in the Timeline panel.

A color or gradient applied to the area inside the area bounded by a path is a fill.

Note:

To specify the size of Bezier direction handles and vertices for masks and shapes, choose Edit > Preferences > General (Windows) or After Effects > Preferences > General (Mac OS), and edit the Path Point Size value.

About shapes and shape layers

Shape layers contain vector graphics objects called shapes. By default, a shape consists of a path, a stroke, and a fill. (See About pathsand Strokes and fills for shapes.)

You create shape layers by drawing in the Composition panel with the shape tools or the Pen tool. (See Creating shapes and masks.)

Shape paths have two varieties: parametric shape paths and Bezier shape paths. Parametric shape paths are defined numerically, by properties that you can modify and animate after drawing, in the Timeline panel. Bezier shape paths are defined by a collection of vertices (path points) and segments that you can modify in the Composition panel. You work with Bezier shape paths in the same way that you work with mask paths. All mask paths are Bezier paths.

You can modify a shape path by applying path operations, such as Wiggle Paths and Pucker & Bloat. You apply a stroke to a path or fill the area defined by a path with color by applying paint operations. (See Shape attributes, paint operations, and path operations for shape layers.)

Shape paths, paint operations, and path operations for shapes are collectively called shape attributes. You add shape attributes using the Add menu in the Tools panel or in the Timeline panel. Each shape attribute is represented as a property group in the Timeline panel, with properties that you can animate, just as you do with any other layer property. (See About animation, keyframes, and expressions.)

The color bit depth of a shape layer is the same as the project as a whole: 8, 16, or 32 bpc. (See Color depth and high dynamic range color.)

Shape layers are not based on footage items. Layers that are not based on footage items are sometimes called synthetic layers. Text layers are also synthetic layers and are also composed of vector graphics objects, so many of the rules and guidelines that apply to text layers also apply to shape layers. For example, you can't open a shape layer in a Layer panel, just as you can't open a text layer in a Layer panel.

You can save your favorite shapes as animation presets. (See Save an animation preset.)

Online resources for shape layers

For a video tutorial creating shape layers from vector layers, visit the learn tutorials page.

Trish and Chris Meyer provide an introduction to shape layers in a PDF excerpt from the "Shape Layers" chapter of their book Creating Motion Graphics with After Effects (5th Edition).

Chris Zwar provides an animation preset on his website that creates a target cross-hair using a single shape layer, with a wide variety of custom properties that make controlling and modifying the cross-hair animation easy and obvious.

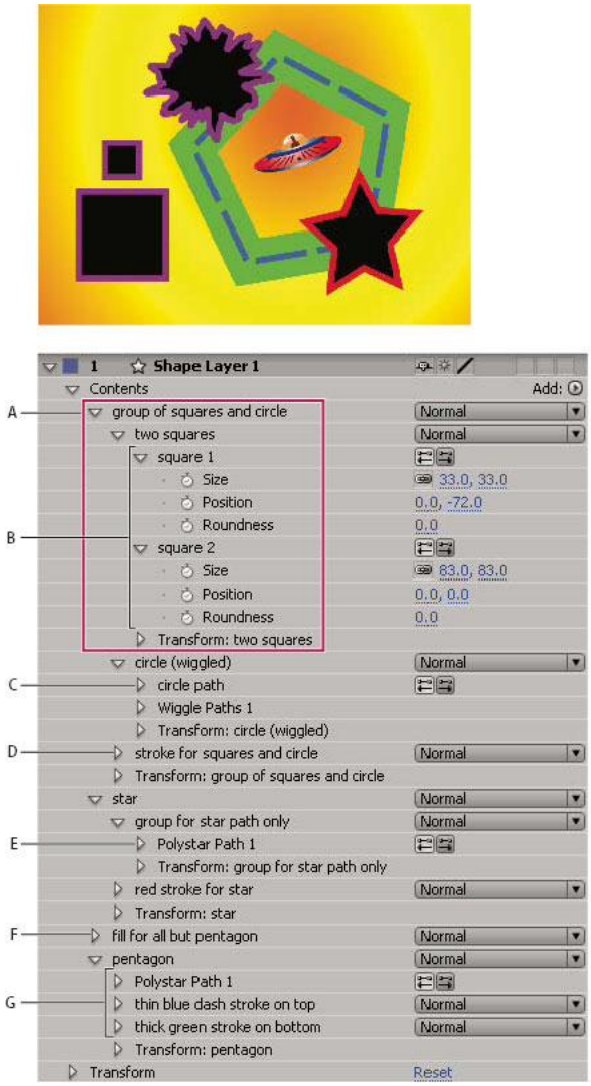
Groups and render order for shapes and shape attributes

Though the default is for a shape to consist of a single path, a single stroke, and a single fill—arranged from top to bottom in the Timeline panel—much of the power and flexibility of shape layers arises from your ability to add and reorder shape attributes and create more complex compound shapes.

You can group shapes or shape attributes that are at the same grouping level within a single shape layer.

A *group* is a collection of shape attributes: paths, fills, strokes, path operations, and other groups. Each group has its own blending mode and its own set of transform properties. By assembling shapes into groups, you can work with multiple shapes simultaneously—such as scaling all shapes in the group by the same amount or applying the same stroke to each shape. You can even place individual shapes or individual shape attributes within their own groups to isolate transformations. For example, you can scale a path without scaling its stroke by grouping the path by itself.

When you add a shape attribute using the Add menu in the Tools panel or Timeline panel, the attribute is added within the group that is selected. You can drag groups and attributes to reorder them in the Timeline panel. By reordering and grouping shapes and shape attributes, you can affect their rendering order with respect to other shapes and shape attributes.



***A** Two shapes in a group **B** Two paths in a compound shape **C** Circle path with Wiggle Paths applied **D** One stroke applied to all paths above it **E** Star path in a group by itself **F** One fill applied to all paths above it **G** One path with two strokes*

Render order for shapes within a shape layer

The rules for rendering a shape layer are similar to the rules for rendering a composition that contains nested compositions:

- Within a group, the shape at the bottom of the Timeline panel stacking order is rendered first.
- All path operations within a group are performed before paint operations. This means, for example, that the stroke follows the distortions in the path made by the Wiggle Paths path operation. Path operations within a group are performed from top to bottom. (See Alter shapes with path operations.)
- Paint operations within a group are performed from the bottom to the top in the Timeline panel stacking order. This means, for example, that a stroke is rendered on top of (in front of) a stroke that appears after it in the Timeline panel. To override this default behavior for a specific fill or stroke, choose Above Previous In Same Group for the Composite property of the fill or stroke in the Timeline panel. (See Strokes and fills for shapes.)

Path operations and paint operations apply to all paths above them in the same group.

Transform properties for shape groups and shape paths

Each group has its own Transform property group. This Transform property group is represented in the Timeline panel with a property group named Transform: [group name] and in the Composition panel as a dashed box with handles. You can group a path by itself and transform only the path using its new Transform property group.

Introducing an additional Transform property group for a single path is useful, for example, for creating complex motion—such as spinning about one anchor point while also revolving along an orbit. The transformations of a group affect all shapes within the group; this behavior is the same as the behavior of layer parenting. (See Parent and child layers.)

Each shape path also has intrinsic properties that affect the position and shape of the path. For parametric shape paths, these properties (such as Position and Size) are parameters visible in the Timeline panel. For Bezier shape paths, these properties are defined for each vertex but are contained within the Path property. When you modify a Bezier path using the free-transform bounding box, you modify these intrinsic properties for the vertices that constitute that path. (See About shapes and shape layers.)

Group shapes or shape attributes

? Select one or more shapes or shape attributes, and do one of the following:

- Choose Layer > Group Shapes.
- Press Ctrl+G (Windows) or Command+G (Mac OS).

When you group shapes, the anchor point for the group is placed in the center of the bounding box for the group.

Ungroup shapes or shape attributes

? Select a single group, and do one of the following:

- Choose Layer > Ungroup Shapes.
- Press Ctrl+Shift+G (Windows) or Command+Shift+G (Mac OS).

Create an empty shape group

? Choose Group (Empty) from the Add menu in the Tools panel or in the Timeline panel.

Creating shapes and masks

Create masks

You can create one or more masks for each layer in a composition using any of the following methods:

- Draw a path using the shape tools or Pen tool. Drawing a mask path is similar to drawing a shape path. (See Create a shape or mask by dragging with shape toolsand Create a Bezier shape or mask using the Pen tool.)
- Specify the dimensions of the mask path numerically in the Mask Shape dialog box. (See Create a rectangular or elliptical mask numerically.)
- Convert a shape path to a mask path by copying the shape's path to the Mask Path property.
- Convert a motion path to a mask path. (See Create a mask or shape from a motion path.)

- Trace color or alpha channel values to create a mask using the Auto-trace command. (See Create a mask from channel values with Auto-trace.)
- Paste a path copied from another layer or from Adobe Illustrator, Photoshop, or Fireworks. (See Copy a path from Illustrator, Photoshop, or Fireworks.)
- Convert a text layer to one or more editable masks on a solid-color layer by using the Create Masks From Text command. (See Create shapes or masks from text characters.)
- Use captured shapes to create motion graphics. (See Use captured shapes to create motion graphics.)

When you create masks on a layer, the mask names appear in the Timeline panel outline in the order in which you create the masks. To organize and keep track of your masks, rename them.

To rename a mask, select it and press Enter (Windows) or Return (Mac OS), or right-click (Windows) or Control-click (Mac OS) the mask name and choose Rename.

When creating additional masks for one layer in the Layer panel, make sure that the Target menu in the Layer panel is set to None; otherwise, you replace the targeted mask instead of creating a mask. You can also lock a mask to prevent changes to it.

When creating or editing masks, look in the Info panel for information such as the mask name and the number of vertices in the mask.

To create a mask that you can move independently of the primary layer that it is masking, do the following:

1. Create the mask on a separate white solid layer, and use that solid layer as a track matte for the primary layer.
2. Use parenting to make the solid layer a child of the primary layer, so that the mask moves with the primary layer as if it were applied directly. Because the solid layer is a child layer, it can also be animated independently of its parent.
3. You can use motion tracking to make the solid layer (and therefore the mask) follow moving objects in the primary layer. (See Convert a layer into a track matteand Parent and child layers.)

Create a rectangular or elliptical mask numerically

1. Select a layer in the Composition panel, or display a layer in the Layer panel.
2. Choose Layer > Mask > New Mask. A new mask appears in the Composition or Layer panel with its handles at the outer edges of the frame.
3. Choose Layer > Mask > Mask Shape.
4. Select Reset To, choose Rectangle or Ellipse from the Shape menu, and specify the size and location of the bounding box for the mask.

Create a mask from channel values with Auto-trace

1. You can convert the alpha, red, green, blue, or luminance channel of a layer to one or more masks by using the Auto-trace command.
2. Auto-trace creates as many Bezier masks as necessary to outline the specified channel values in the layer.
3. It also creates masks with the smallest number of vertices possible while conforming to the settings that you choose.

4 You can modify a mask created with Auto-trace as you would any other mask, and you can link its path to other path types, such as shape paths on a shape layer, using expressions.

When you apply Auto-trace, affected layers are automatically set to Best Quality to ensure accurate results.

To reduce the number of masks created by Auto-trace, apply a keying effect to the layer to isolate your subject before applying Auto-trace.

1 In the Timeline panel, do one of the following:

- To create mask keyframes at a single frame, drag the current-time indicator to the desired frame.
- To create mask keyframes across a range of frames, set a work area that spans that range.

2 Select one or more layers.

3 Choose Layer > Auto-trace.

4 Select one of the following:

Current Frame Creates mask keyframes at only the current frame.

Work Area Creates mask keyframes for frames within the work area.

5 Set any of the following options:

Invert Inverts the input layer before searching for edges.

Blur Blurs the original image before generating the tracing result. Select this option to reduce small artifacts and to smooth jagged edges in the tracing result. Deselect this option to closely trace details in a high-contrast image. Specify the radius, in pixels, of the area used for the blurring operation. Larger values result in more blur.

Tolerance How far, in pixels, the traced path is allowed to deviate from the contours of the channel.

Threshold Specifies, as a percentage, the value that a pixel's channel must have for that pixel to be considered part of an edge. Pixels with channel values over the threshold are mapped to white and are opaque; pixels with values under the threshold are mapped to black and are transparent.

Minimum Area Specifies the smallest feature in the original image that is traced. For example, a value of 4 removes features smaller than 2 pixels wide by 2 pixels high from the tracing result.

Corner Roundness Specifies the roundness of the mask curve at vertices. Enter a higher value for smoother curves.

Apply To New Layer Applies the mask to a new solid the same size as the selected layer. This control is automatically selected for layers that have Collapse Transformations enabled—it creates a layer the same size as the composition that contains the layer.

Preview Select to preview the mask results and the results of the various options of the Auto-trace command.

Create shapes and shape layers

You create a shape layer by drawing in the Composition panel with a shape tool or the Pen tool. You can then add shape attributes to existing shapes or create shapes within that shape layer. By default, if you draw in the Composition panel when a shape layer is selected, you create a shape within that shape layer, above the selected shapes or group of shapes. If you draw in the Composition panel using a shape tool or Pen tool when an image layer other than a shape layer is selected, you create a mask.

Before drawing in the Composition panel to create a shape layer, press F2 and deselect all layers.

You can create shapes and shape layers using any of the following methods:

- Draw a path using the shape tools or Pen tool. Drawing a mask path is similar to drawing a shape path. (See Create a shape or mask by dragging with shape toolsand Create a Bezier shape or mask using the Pen tool.)
- Convert a text layer to shapes on a shape layer by using the Create Shapes From Text command. (See Create shapes or masks from text characters.)
- Convert a mask path to a shape path.
- Convert a motion path to a shape path. (See Create a mask or shape from a motion path.)
- Paste a path copied from another layer or from Adobe Illustrator, Photoshop, or Fireworks. (See Copy a path from Illustrator, Photoshop, or Fireworks.)
- Create an empty shape layer by choosing Layer > New > Shape Layer.

Usually, a new shape has a fill and a stroke that correspond to the Fill and Stroke settings in the Tools panel at the time that the shape is drawn. You can use the same controls in the Tools panel to change these attributes for a selected shape after it has been drawn. Shapes created from text are created with fills and strokes that match the fills and strokes of the original text.

Note:

To draw a mask on a shape layer, click the Tool Creates Mask button in the Tools panel with a shape tool or Pen tool active. For more information about creating masks, see Create masks.

Convert Vector Art Footage to Shape

You can create a shape layer from a vector art footage layer, and then modify it. With the ability to bevel and extrude objects in After Effects, you can extrude the artwork, for example, extruded logos. For more information, see Extruding text and shape layers.

To convert a vector art footage layer to shape layer:

? Choose **Layer** > **Create Shapes from Vector Layer**. A matching shape layer appears above the footage layer, and the footage layer is muted.

  The following issues are known:

  - Not all features of Illustrator files are currently preserved. Examples include: opacity, images, and gradients.
  - Converted shapes ignore PAR overrides specified in the Interpret Footage dialog box.
  - Gradients and unsupported types may show as 50% gray shapes.
  - Files with thousands of paths may import slowly without feedback.
  - The menu command works on a single selected layer at a time.
  - If you import an Illustrator file as a composition (i.e., several layers), you cannot convert all those layers in one pass. However, you can import the file as footage, and then use the command to convert the single footage layer to shapes.

Create a shape or mask by dragging with shape tools

The shape tools are the Rectangle , Rounded Rectangle , Ellipse , Polygon , and Star tools.

To activate and cycle through the shape tools, press Q.

A polygon is a star without an Inner Radius or Inner Roundness property. So, the name of the shape created for a polygon or a star is the same: polystar.

You can create a mask by dragging with a shape tool on a selected layer in the Composition panel or Layer panel. You can create a shape by dragging with a shape tool on a selected shape layer in the Composition panel. If you drag with a shape tool in the Composition panel with no layer selected, you create a shape on a new shape layer.

Note:

To draw a mask on a shape layer, click the Tool Creates Mask button in the Tools panel with a shape tool active.

When you create a shape by dragging with a shape tool in the Composition panel, you create a parametric shape path. To instead create a Bezier shape path, press the Alt (Windows) or Option (Mac OS) key before you click to begin dragging. You can release the key before you complete the drag operation. All mask paths are Bezier paths. (See About shapes and shape layers.)

Dragging starts when you click in the Composition panel or Layer panel to begin drawing, and ends when you release the mouse button. Pressing modifier keys at different times during a single dragging operation achieves different results:

- To reposition a shape or mask as you are drawing, hold the spacebar or the middle mouse button while dragging.
- To scale a circle, ellipse, square, rounded square, rectangle, or rounded rectangle around its center while drawing, hold the Ctrl (Windows) or Command (Mac OS) key after you begin dragging. Don't release the key until you have released the mouse button to finish drawing.
- To cancel the drawing operation, press Esc.

Note:

Each shape tool retains the settings of the most recent drawing operation with that tool. For example, if you draw a star and modify the number of points to be 10, then the next star that you draw will also have 10 points. To reset settings for a tool and create a shape with the default settings, double-click the tool in the Tools panel. (See Create a shape or mask the size of the layer.)

Draw rectangles, rounded rectangles, squares, and rounded squares

1. Select the Rectangle tool or the Rounded Rectangle tool , and do one of the following:
   - To draw a rectangle or rounded rectangle, drag diagonally.
   - To draw a square or rounded square, Shift-drag diagonally.
2. (Optional) If drawing a rounded rectangle or rounded square, do the following before releasing the mouse button:
   - To increase or decrease the corner roundness, press the Up arrow key or the Down arrow key, or roll the mousewheel forward or backward.
   - To set corner roundness to the minimum or maximum, press the Left arrow key or the Right arrow key.
3. Finish drawing by releasing the mouse button. If drawing a square or rounded square, release the Shift key after releasing the mouse button.

Note:

Squares are created to be square according to the pixel aspect ratio of the composition. If the pixel aspect ratio of the composition is not 1, then squares appear square in the Composition panel only if the Toggle Pixel Aspect Ratio button is selected at the bottom of the Composition panel.

Draw ellipses and circles

1 Select the Ellipse tool , and do one of the following:

- To draw an ellipse, drag diagonally.
- To draw a circle, Shift-drag diagonally.

2 Release the mouse button to finish drawing. If drawing a circle, release the Shift key after releasing the mouse button.

Note:

Circles are created to be circular according to the pixel aspect ratio of the composition. If the pixel aspect ratio of the composition is not 1, then circles appear circular in the Composition panel only if the Toggle Pixel Aspect Ratio button is selected at the bottom of the Composition panel.

Draw polygons and stars

1 Select the Polygon tool or the Star tool , and do one of the following:

- Drag to scale and rotate the polygon or star as you draw it.
- Shift-drag to scale the polygon or star as you draw it, preventing rotation.

2 (Optional) Do the following before releasing the mouse button:

- To add or remove points, press the Up arrow key or the Down arrow key, or roll the mouse wheel forward or backward.
- To increase or decrease the outer roundness, press the Left arrow key or the Right arrow key.
- To keep the inner radius of a star constant as you move the mouse to increase the outer radius, hold the Ctrl (Windows) or Command (Mac OS) key.
- To increase or decrease the inner roundness of a star, press the Page Up key or the Page Down key.

3 Release the mouse button to finish drawing. If Shift-dragging to prevent rotation, release the Shift key after releasing the mouse button.

Create a Bezier shape or mask using the Pen tool

You can create a Bezier mask using the Pen tool on a selected layer in the Composition panel or Layer panel. You can create a shape with a Bezier path using the Pen tool on a selected shape layer in the Composition panel. If you draw with the Pen tool in the Composition panel with no layer selected, you create a shape on a new shape layer.

Creating a RotoBezier path is similar to creating a manual Bezier path. The primary difference is that direction lines for vertices and curvature for path segments are automatically calculated.

Create a manual Bezier path using the Pen tool

1 With the Pen tool selected and the RotoBezier option deselected in the Tools panel, click in the Composition panel where you want to place the first vertex.

2 Click where you want to place the next vertex. To create a curved segment, drag the direction line handle to create the curve that you want.

To reposition a vertex after you've clicked to place it but before you've released the mouse button, hold the spacebar while dragging.

The last vertex that you add appears as a solid square, indicating that it is selected. Previously added vertices become hollow, and deselected, as you add more vertices.

3 Repeat step 2 until you are ready to complete the path.

4 Complete the path by doing one of the following:

- To close the path, place the pointer over the first vertex and, when a closed circle icon appears next to the pointer , click the vertex.

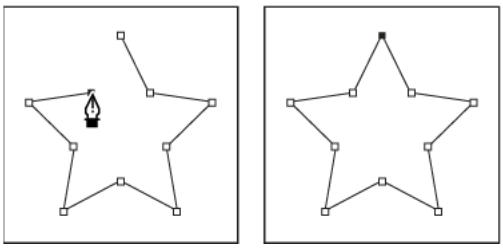
Note:

You can also close a path by double-clicking the last vertex or choosing Layer > Mask And Shape Path > Closed.

- To leave the path open, activate a different tool, or press F2 to deselect the path.

Draw straight manual Bezier path segments with the Pen tool

The simplest path that you can draw with the Pen tool is a straight line, made by clicking with the Pen tool to create two vertices. By continuing to click, you create a path made of straight-line segments connected by corner points.



Clicking with Pen tool creates straight segments.

1 Place the Pen tool where you want the straight segment to begin, and click to place a vertex. (Do not drag.)

2 Click again where you want the segment to end. (Shift-click to constrain the angle between segments at the corner point to a whole multiple of 45°.)

3 Continue clicking to set vertices for additional straight segments.

Draw curved manual Bezier path segments with the Pen tool

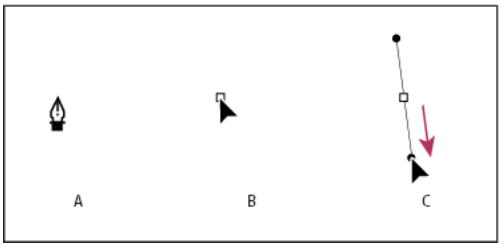
You create a curved path segment by dragging direction lines. The length and direction of the direction lines determine the shape of the curve.

Shift-drag to constrain the angle of the direction lines to whole multiples of 45°. Alt-drag (Windows) or Option-drag (Mac OS) to modify only the outgoing direction line.

1 Place the Pen tool where you want the curve to begin, and hold the mouse button down.

A vertex appears, and the Pen tool pointer changes to an arrowhead.

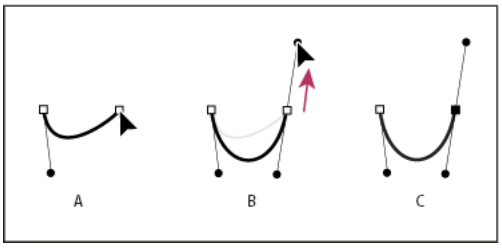
2 Drag to modify the length and direction of both direction lines for a vertex, and then release the mouse button.



Drawing the first vertex in a curved path
***A** Placing the Pen tool **B** Starting to drag (mouse button pressed) **C** Dragging to extend direction lines*

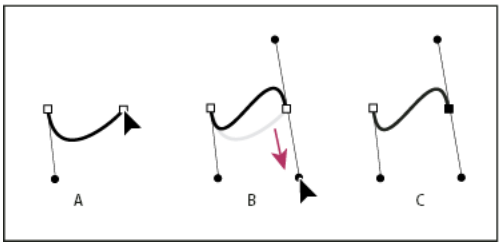
3 Place the Pen tool where you want the curved segment to end, and do one of the following:

- To create a C-shaped curve, drag in the direction opposite from the direction that you dragged the previous direction line, and then release the mouse button.



Drawing the second vertex in a curved path
***A** Starting to drag **B** Dragging away from previous direction line, creating a C curve **C** Result after releasing mouse button*

- To create an S-shaped curve, drag in the same direction as the previous direction line, and then release the mouse button.



Drawing an S curve
***A** Starting to drag **B** Dragging in same direction as previous direction line, creating an S curve **C** Result after releasing mouse button*

4 Continue dragging the Pen tool from different locations to create a series of smooth curves.

Create a shape or mask the size of the layer

1 Select the destination for the new mask or shape:

- To create a shape on an existing shape layer, select the shape layer.
- To create a shape on a new shape layer with the dimensions of the composition, deselect all layers by pressing F2.
- To create a mask, select a layer in the Timeline panel, Layer panel, or Composition panel. To create a mask on a shape layer, select Tool Creates Mask in the Tools panel with a shape tool active.
- To replace a mask path, select the mask in the Timeline panel, Layer panel, or Composition panel.
- To replace a shape path, select the shape path (not the group) in the Composition panel or Timeline panel.

2 In the Tools panel, double-click the Rectangle, Rounded Rectangle, Ellipse, Polygon, or Star tool.

Create shapes or masks from text characters

The Create Shapes From Text command extracts the outlines for each character, creates shapes from the outlines, and puts the shapes on a new shape layer. You can then use these shapes as you would any other shapes.

The Create Masks From Text command extracts the outlines for each character, creates masks from the outlines, and puts the masks on a new solid-color layer. You can then use these masks as you would any other masks.

Some font families, such as Webdings, include characters that are graphical images, rather than text. Converting text from these font families can be a good way to get started with simple graphical elements in shape layers.

Create shapes from text

1 Select the text to convert to shapes:

- To create shapes for all characters in a text layer, select the text layer in the Timeline panel or Composition panel.
- To create shapes for specific characters, select the characters in the Composition panel.

2 Do one of the following:

- Choose Layer > Create Shapes From Text.
- Right-click (Windows) or Control-click (Mac OS) the layer or text and choose Create Shapes From Text from the context menu.

The Video switch for the text layer is turned off.

The new shape layer is created at the top of the layer stacking order. The new layer contains one shape group for each selected character, plus fill and stroke properties that match the fills and strokes of the text.

For characters that consist of compound paths—such as *i* and *e*—multiple paths are created and combined with the Merge Paths path operation.

Effects, masks, layer styles, and keyframes and expressions for properties in the Transform property group of the text layer are copied to the new shape layer or solid-color layer.

Create masks from text

1 Select the text to convert to masks:

- To create masks for all characters in a text layer, select the text layer in the Timeline panel or Composition panel.
- To create masks for specific characters, select the characters in the Composition panel.

2 Do one of the following:

- Choose Layer > Create Masks From Text.
- Right-click (Windows) or Control-click (Mac OS) the layer or text and choose Create Masks From Text from the context menu.

The Video switch for the text layer is turned off.

The new solid-color layer is created at the top of the layer stacking order.

For characters that consist of compound paths—such as *i* and *e*—multiple masks are created and combined with the Subtract mask mode.

For more information, see the Use masks to control effects tutorial.

Copy a path from Illustrator, Photoshop, or Fireworks

You can copy a path from Illustrator or Photoshop and paste it into After Effects as a mask path or shape path.

To make the data copied from Illustrator compatible with After Effects, the AICB option must be selected in the Files & Clipboard section of the Adobe Illustrator Preferences dialog box.

For a path imported from Photoshop to be scaled correctly, the Photoshop document must have a resolution of 72 dpi. 72 dpi is the Resolution setting of documents created in Photoshop using a Film & Video preset.

Note: You can also use a copied Illustrator, Photoshop, or Fireworks path as an After Effects motion path. See Create a motion path from a mask, shape, or paint path for more information.

1. In Illustrator, Photoshop, or Fireworks, select an entire path, and then choose Edit > Copy.
2. In After Effects, do one of the following to define a target for the paste operation:
   - To create a mask, select a layer.
   - To replace an existing mask path or shape path, select its Path property.

   Note:

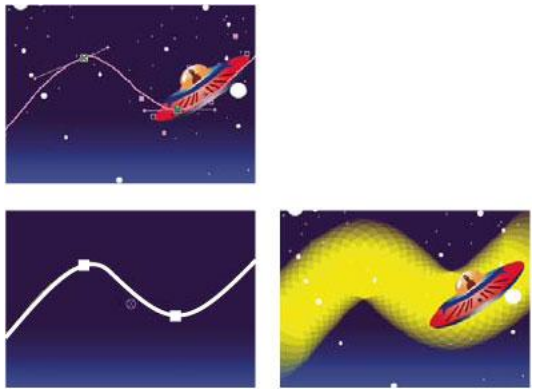
   To paste a path as a shape path, you must select the Path property of an existing shape in a shape layer. This selection tells After Effects what the target of the paste operation is; if the target isn't specified in this way, After Effects assumes that the target is the entire layer and therefore draws a new mask. If there is no Path property—perhaps because the shape layer is empty—then you can draw a placeholder path with the Pen tool and then paste the path from Illustrator into the placeholder path.
3. Choose Edit > Paste.

   If you paste multiple paths into a shape path, the first path goes into the shape path, and the remaining paths are pasted into new mask paths. This behavior is because the paths other than the first one don't have a clearly defined target, so they are added to the entire layer as masks.

Create a mask or shape from a motion path

You can copy position keyframes, anchor point keyframes, or an effect control point's position keyframes and paste those keyframes into a selected mask path or shape path. When you create mask paths or shape paths from motion paths, make sure that you copy keyframes from a single Position property only—do not copy the keyframes of any other property.

Draw a motion path with Motion Sketch and then paste the path into a mask path or shape path.



The motion path of the spaceship (top) is copied to the background layer (lower-left) and used by the Vegas effect (lower-right).

Note:

When copying between a mask path to a motion path, keep in mind that the mask path's values are expressed in the coordinate system of the layer (layer space), whereas the motion path's values are expressed in the coordinate system of the composition (composition space). This difference causes the pasted path to be offset, requiring you to reposition the path after pasting it. (See Coordinate systems: composition space and layer space.)

Create a mask path from a motion path

1. In the Timeline panel, click the name of the Position property or Anchor Point property from which you want to copy the motion path. (This selects all keyframes. To select only some of the keyframes of a motion path, Shift-click them.)
2. Choose Edit > Copy.
3. To create a mask, select the layer on which to create the mask, and choose Layer > Mask > New Mask.
4. In the Timeline panel, click the name of the Mask Path property for the mask into which to paste the keyframes from the motion path.
5. Choose Edit > Paste.

Create a shape path from a motion path

1. In the Timeline panel, click the name of the Position property or Anchor Point property from which you want to copy the motion path. (This selects all keyframes. To select only some of the keyframes of a motion path, Shift-click them.)
2. Choose Edit > Copy.
3. To create a shape layer, press F2 to deselect all layers, then click in the Composition panel with the Pen tool to create a single-point Bezier path.
4. Press SS to reveal the Path property for the shape. Click the name of the Path property into which to paste the keyframes from the motion path.
5. Choose Edit > Paste.

Duplicate a shape group while transforming

When a shape group is selected in group selection mode, you can duplicate the group while moving, rotating, or scaling it in the Composition panel.

- Hold the Alt (Windows) or Option (Mac OS) key as you drag to transform a group.

  The pointer changes to a duplication pointer (or) as you hold the key and place the pointer near the group transform box.

Managing and animating shape paths and masks

You animate mask paths and shape paths in much the same way that you animate other properties: set keyframes for the Mask Path or Path property, set paths at each keyframe, and After Effects will interpolate between these specified values.

Rotoscoping introduction and resources

Rotoscoping (commonly known as roto) is the drawing or painting on frames of a movie, using visual elements in the movie as a reference. A common kind of rotoscoping is tracing a path around an object in a movie and using that path as a mask to separate the object from its background. This allows you to work with the object and the background separately, so you can do things like apply different effects to the object than to its background or replace the background.

Note:

After Effects includes the Roto Brush and Refine Edge tools, which can be used to accomplish many of the same tasks as conventional rotoscoping, but in far less time. For information about using the Roto Brush tool, see Roto Brush, Refine Edge, and Refine Matte effects.

If a background or foreground object is a consistent, distinct color, you can use color keying instead of rotoscoping to remove the background or object. If the footage was shot with color keying in mind, color keying is much easier than rotoscoping. (See Keying introduction and workflow.)

Rotoscoping in After Effects is mostly a matter of drawing masks, animating the mask path, and then using these masks to define a matte. Many additional tasks and techniques make this job easier, such as using motion tracking on the object before you begin drawing masks, and then using the motion tracking data to make a mask or matte automatically follow the object.

Rotoscoping tips

- Immediately after beginning to draw a mask, press Alt+Shift+M (Windows) or Option+Shift+M (Mac OS) to turn on keyframing for that mask and set a keyframe. This way, you won't edit a mask frame-by-frame for several minutes (or longer) and then realize that you lost all of your work on previous frames because you forgot to click the stopwatch to make the mask path animated.
- Draw your masks on a white solid layer with its Video (eyeball) switch off, above the (locked) footage layer. This way, you run no risk of accidentally moving the footage layer when you manipulate the mask, and you can also much more easily apply tracking data to the mask. (You apply the tracking data to the invisible solid layer that holds the mask.) This also means that you don't lose your cached preview frames each time you manipulate the mask. (See Toggle visibility or influence of a layer or property group and Lock or unlock a layer.)

- Turn on the Preserve Constant Vertex Count preference. (See Designate the first vertex for a Bezier path.)
- When possible, transform (rotate, scale, move) the whole mask or a subset of the mask vertices instead of moving the vertices individually. This is both for efficiency and to avoid the chatter that comes from inconsistent movement across frames. (See Move vertices in free-transform mode.)
- Manual motion tracking is less time-consuming than manual rotoscoping. The more effort you spend getting good tracking data for various parts of your scene and object, the less time you'll spend drawing and fine-tuning masks. (See Tracking and stabilizing motion.)
- Use the Variable-width mask featheringfeature for more control when feathering objects.

View mask paths and shapes

- To view mask paths for selected layers in the Timeline panel, press M.
- To view selected masks or shapes in the Timeline panel, press SS (press the S key twice).
- To view mask and shape paths in the Composition panel, click the Toggle Mask And Shape Path Visibility button at the bottom of the Composition panel.
- To view mask paths in the Layer panel, choose Masks from the Layer panel View menu.
- To hide a mask path while showing others, lock the mask by selecting its Lock switch in the Timeline panel, and then choose Layer > Mask > Hide Locked Masks.
- To isolate selected masks and hide others, choose Layer > Mask > Lock Other Masks, and then choose Layer > Mask Hide Locked Masks.

Select shape paths, shapes, and shape groups

You can select shape layers and their components at any of four levels of selection, referred to as *selection modes*:

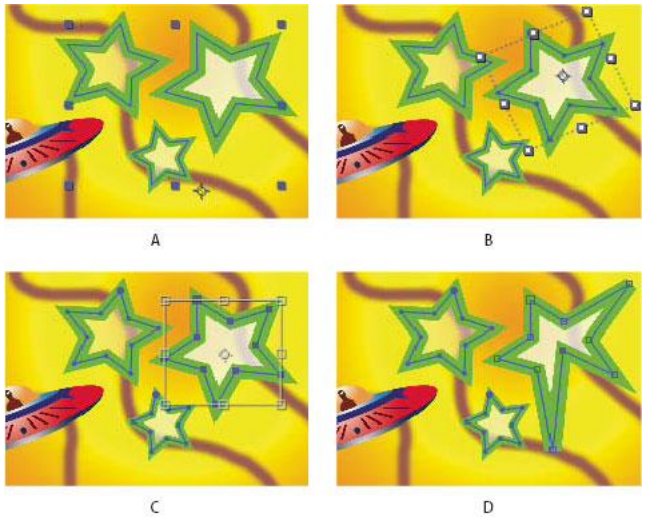
Layer selection mode The entire shape layer is selected. Transformations apply to the transform properties for the layer, in the Transform property group that is at the same level as the Contents property group.

Group selection mode An entire shape group is selected. Transformations apply to the transform properties for the group, in the Transform property group within the shape group in the Timeline panel.

Free-transform mode Multiple vertices on one or more Bezier paths are selected. A free-transform bounding box is shown around the vertices in the Composition panel. By operating on this box, you can move multiple vertices with a single transformation. Transformations apply to the vertices themselves, which are contained within the Path property in the Timeline panel.

Path-editing mode Only vertices are selected. In this mode, you can perform path-editing operations, such as adding vertices to a path and moving individual vertices.

When a pen tool is active, path-editing mode is active. To remain in path-editing mode, select the Pen tool; press V or Ctrl (Windows) or Command (Mac OS) to temporarily activate the Selection tool as needed.



Selection modes for shapes on shape layers
***A** Layer selection **B** Group selection **C** Free-transform **D** Path editing*

For information on selecting masks, see Select masks, segments, and vertices.

Press Ctrl+A (Windows) or Command+A (Mac OS) with a shape vertex selected to select all vertices on that path. Press again to select all shapes. Press again to select all layers.

Select a shape layer

- Click the layer name or layer duration bar in the Timeline panel.
- Using the Selection tool, click within the layer bounds in the Composition panel.
- To deselect all shapes on a layer but leave the shape layer selected, click within the layer bounds but outside all shape paths.

Select a shape group in group selection mode

- Using the Selection tool, double-click a member of the group in the Composition panel. Each time that you double-click, you descend another level in the group hierarchy.
- To activate the Direct Selection tool , hold Ctrl (Windows) or Command (Mac OS) with the Selection tool selected. Click a shape in the Composition panel with the Direct Selection tool to directly select that shape's group, regardless of how deeply nested the shape is in the group hierarchy.
- To select a group that is contained within the same group as the group that is already selected, click the group to select.
- To add a group to a selection, Shift-click it. You can combine the Shift key with double-clicking and with the Direct Selection tool to add more deeply nested groups to the selection.

Select paths and vertices in path-editing mode

To specify the size of Bezier direction handles and vertices for masks and shapes, choose Edit > Preferences > General (Windows) or After Effects > Preferences > General (Mac OS), and edit the Path Point Size value.

- To select a vertex, click the vertex with the Selection tool. To add vertices to the selection, Shift-click them.
- To select a path segment, click the segment with the Selection tool. To add segments to the selection, Shift-click them.
- To select an entire path, Alt-click (Windows) or Option-click (Mac OS) a segment or vertex of the path with the Selection tool, or select any portion of the path and press Ctrl+A (Windows) or Command+A (Mac OS).
- To select vertices by dragging, select a path or portion of a path to enter path-editing mode, and then drag with the marquee-selection tool to draw a marquee-selection box around the vertices to select. To add vertices to the selection, hold down the Shift key as you draw additional marquee-selection boxes.

Select all points on a path and enter free-transform mode

- Double-click a path segment while in path-editing mode or in group selection mode for a single shape.
- Select the Path property in the Timeline panel and press Ctrl+T (Windows) or Command+T (Mac OS).

Select masks, segments, and vertices

Unlike layers, masks can have more than one level of selection. You can select a mask as a whole path, which is appropriate when you want to move or resize a mask. However, if you want to change the path of a mask, select one or more points on it. Selected points appear solid, and unselected points appear hollow.

To specify the size of Bezier direction handles and vertices for masks and shapes, choose Edit > Preferences > General (Windows) or After Effects > Preferences > General (Mac OS), and edit the Path Point Size value.

Select or deselect masks in the Layer or Composition panel

- To select a vertex on a mask, click the vertex with the Selection tool . To add vertices to the selection, Shift-click them.
- To select a mask segment, click the segment with the Selection tool. To add segments to the selection, Shift-click them.
- To select an entire mask, Alt-click (Windows) or Option-click (Mac OS) a segment, vertex, or handle of a mask with the Selection tool, or select any portion of the mask and choose Edit > Select All or press Ctrl+A (Windows) or Command+A (Mac OS). To add masks to the selection, Alt+Shift-click (Windows) or Option+Shift-click (Mac OS) them.
- To select masks by dragging, select a mask or portion of a mask to enter mask editing mode and then drag with the Selection tool to draw a marquee-selection box completely around the vertices or masks that you want to select. To add masks or vertices to the selection, hold down the Shift key as you draw additional marquee-selection boxes.
- To select all masks on a layer, select a mask on the layer, and choose Edit > Select All or press Ctrl+A (Windows) or Command+A (Mac OS).
- To deselect all masks, press Ctrl+Shift+A (Windows) or Command+Shift+A (Mac OS).
- To select an adjacent mask on a layer, press Alt+accent grave (`) (Windows) or Option+accent grave (`) (Mac OS) to select the next mask, or Shift+Alt+accent grave (`) (Windows) or Shift+Option+accent grave (`) (Mac OS) to select the previous mask.
- To deselect a mask, click anywhere other than on the mask.

- To remove a vertex or segment from a selection, Shift-click the vertex or segment.

To use the Selection tool when the Pen tool is selected, hold down Ctrl (Windows) or Command (Mac OS).

Select masks in the Timeline panel

1. Click the right arrow next to a layer name to expand it.
2. Click the right arrow next to the Masks heading to expand it, revealing all masks on that layer.
3. Do any of the following:
   - To select one mask, click its name.
   - To select a contiguous range of masks, Shift-click the names of the first and last masks in the range.
   - To select discontiguous masks together, Ctrl-click (Windows) or Command-click (Mac OS) the names of any masks you want to include.

Note:

You can select only whole masks in the Timeline panel. To select individual vertices on a mask, use the Composition or Layer panel.

Lock or unlock masks

Locking a mask prevents you from selecting it in the Timeline, Composition, and Layer panels or setting it as a target in the Layer panel. Use this feature to avoid unwanted changes to the mask.

1. In the Timeline panel, expand the Masks property group.
2. In the A/V Features column, click the box underneath the Lock icon next to the mask you want to lock or unlock. A mask is locked and cannot be selected when its Lock switch is selected—that is, when the Lock icon appears in the box.

Note:

To unlock multiple masks at one time, select one or more layers and choose Layer > Mask > Unlock All Masks.

To isolate selected masks and hide others, choose Layer > Mask > Lock Other Masks, and then choose Layer > Mask Hide Locked Masks.

Move vertices in free-transform mode

You can scale and rotate an entire mask or shape path (or selected vertices in one or more paths) using the Free Transform Points command. When you use this command, a *free-transform bounding box* surrounds the selected vertices, and an anchor point appears in the center of the bounding box to mark the anchor point for the current transformation. You can scale and rotate the selected vertices by dragging the bounding box or its handles. You can also change the reference point from which the vertices are rotated or scaled by moving the bounding box anchor point. The free-transform bounding box handles and anchor point exist independently of the handles and anchor point for the layer.

Note:

When you animate rotation using Free Transform Points, the vertices of the mask are interpolated in a straight line from keyframe to keyframe. For this reason, the results may be different from what you expect.

1 Display the layer containing the paths that you want to transform in the Composition or Layer panel.

2 Using the Selection tool, do one of the following:

- To transform any number of vertices, select the vertices that you want to transform and choose Layer > Mask And Shape Path > Free Transform Points.
- To transform an entire mask or shape path, select it in the Timeline panel and choose Layer > Mask And Shape Path > Free Transform Points.

3 To move the anchor point of the bounding box, place the Selection tool over the bounding box anchor point until the Selection tool changes to a move anchor point icon. Drag to position the anchor point.

4 Do any combination of the following:

- To move the path or selected vertices, position the pointer inside the bounding box and drag.
- To scale the path or selected vertices, position the pointer on a bounding box handle and, when the pointer changes to a straight, double-sided arrow, drag to a new size. Hold down Shift as you drag to constrain the scale. Hold down Ctrl (Windows) or Command (Mac OS) as you drag to scale around the anchor point of the bounding box.
- To rotate the path or selected vertices, position the pointer just outside the free-transform bounding box and, when the pointer changes to a curved double-sided arrow, drag to rotate.

5 To exit free-transform mode, press Esc, Enter (Windows), or Return (Mac OS).

Convert a path between manual Bezier and RotoBezier

You can convert any manual Bezier mask path or manual Bezier shape path to a RotoBezier path. If the manual Bezier path has direction handles that have been adjusted, this conversion changes the shape of the path, because After Effects calculates the curvature of RotoBezier segments automatically.

The conversion of a RotoBezier path to a manual Bezier path does not change the shape of the path.

1 Select a mask in the Layer, Composition, or Timeline panel, or select a shape path in the Composition or Timeline panel.

2 Choose Layer > Mask And Shape Path > RotoBezier.

Modify a Bezier mask path or shape path

You can change a Bezier mask path using the Selection tool and pen tools in the Layer or Composition panel. You can change a Bezier shape path using the Selection tool and pen tools in the Composition panel.

The pen tools—Add Vertex, Delete Vertex, and Convert Vertex tools—are grouped with the Pen tool in the Tools panel. To reveal these tools in the Tools panel, click and hold the Pen tool in the Tools panel.

In most cases, the appropriate pen tool becomes active when you place the Pen tool pointer in a particular context. For example, the Delete Vertex tool becomes active when you place the Pen tool pointer over an existing vertex, and the Add Vertex tool becomes active when you place the Pen tool pointer over a path segment. To manually activate and cycle through these tools, press G.

When modifying a path, make sure that you click only existing vertices or segments; otherwise, you may create a new path instead.

Move, add, or delete a vertex

? Do one of the following:

- To move a vertex, drag the vertex with the Selection tool.

To temporarily switch from the Pen tool to the Selection tool, press V or Ctrl (Windows) or Command (Mac OS).

- To add a vertex to a mask, use the Add Vertex tool to click the segment between two existing vertices.
- To delete a vertex from a mask, use the Delete Vertex tool to click the vertex.

Adjust a path segment

? Do one of the following with the Selection tool:

- Drag a vertex.
- Drag the direction handles extending from an adjoining smooth vertex.
- Drag a curved segment.

Dragging a curved segment on a RotoBezier mask also moves the vertices.

Toggle a vertex between a smooth point and a corner point

? Click the vertex with the Convert Vertex tool.

To activate the Convert Vertex tool when the Pen tool is selected, hold down Alt (Windows) or Option (Mac OS).

Adjust the tension of a RotoBezier mask

1 If you want to adjust the tension of more than one vertex simultaneously, then select them.

2 Using the Convert Vertex tool, drag a vertex.

To activate the Convert Vertex tool when the Pen tool is selected, hold down Alt (Windows) or Option (Mac OS).

The Adjust Tension pointer appears as you drag a vertex of the RotoBezier mask.

Clicking a vertex instead of dragging sets the vertex to a corner point (100% tension); clicking again sets the vertex to a smooth point (33% tension). Dragging up or to the right decreases the tension of the selection, increasing the curve of adjacent path segments; dragging down or to the left increases the tension of the selection, decreasing the curve of adjacent path segments.

To view the tension value of a vertex, look in the Info panel as you adjust the tension.

Change a mask path numerically

1. Select the mask.
2. In the Timeline panel, expand the Mask properties.
3. Next to the Mask Path property, click the underlined word, and specify the changes in the Mask Shape dialog box.

Designate the first vertex for a Bezier path

To animate a path, After Effects designates the topmost vertex at the initial keyframe as the *first vertex* and numbers each successive vertex in ascending order from the first vertex. After Effects then assigns the same numbers to the corresponding vertices at all successive keyframes. After Effects interpolates the movement of each vertex from its initial position at one keyframe to the position of the correspondingly numbered vertex at the next keyframe. At any time during an animation, you can designate another vertex as the first vertex; this causes After Effects to renumber the vertices of the path. Renumbering vertices causes path animation to change, because After Effects then maps the new vertex numbers to the corresponding old vertex numbers still saved at successive keyframes.

When copying a closed path into a motion path, the vertex designated as the first vertex of the closed path is used as the beginning of the motion path. All motion paths are open paths.

Some shape path operations, such as Trim Paths, also use the first vertex as input to determine how to modify the path.

Note:

By default, when you add a vertex to a path, the new vertex appears on the path throughout the duration of the path but reshapes the path only at the time at which it was added. When you delete a vertex from a path at a specific point in time, the vertex is deleted from the path throughout the duration of the path. Prevent After Effects from adding and deleting vertices throughout the duration of the path by choosing Edit > Preferences > General (Windows) or After Effects > Preferences > General (Mac OS), and deselecting Preserve Constant Vertex Count When Editing Masks.

Note: Preserve Constant Vertex Count When Editing Masks is called "Preserve Constant Vertex and Feather Count when Editing Masks", in After Effects CC and CS6.

1. Create an animated path.
2. In the Timeline panel, move the current-time indicator to the point where you want to designate a new first vertex.
3. Select the vertex to designate as the first vertex.
4. Choose Layer > Mask And Shape Path > Set First Vertex.

   Note:

   The vertex designated as the first vertex appears slightly larger than the other vertices in the Composition panel.

Animate a mask path with Smart Mask Interpolation

Smart Mask Interpolation provides a high level of control for creating mask path keyframes and smooth, realistic animation. After you select the mask path keyframes to interpolate, Smart Mask Interpolation creates intermediate keyframes based on settings you provide. The Info panel displays the progress of the interpolation and the number of keyframes created.

1. Choose Window > Mask Interpolation.
2. Select at least two adjacent mask path keyframes.

3 Set options in the Mask Interpolation panel, and then click Apply.

Note:

To interrupt the interpolation process, press Esc. The Info panel indicates that the process has been interrupted and reports the number of keyframes created.

Keyframe Rate Specifies the number of keyframes that Smart Mask Interpolation creates per second between the selected keyframes. For example, a value of 10 creates a new keyframe every 1/10 of a second. Choose Auto to set the keyframe rate equal to the composition frame rate, which appears in parentheses. Create more keyframes for smoother animation; create fewer keyframes to reduce render time.

Note:

Regardless of the keyframe rate you choose, Smart Mask Interpolation always adds keyframes at the frame just after the first mask path keyframe and at the frame just before the second mask path keyframe. For example, if you interpolate between keyframes at 0 seconds and 1 second in a 30-fps composition with a keyframe rate of 10 keyframes per second, mask path keyframes are added at frame numbers 1, 3, 6, 9, 12, 15, 18, 21, 24, 27, and 29.

Keyframe Fields Doubles the keyframe rate. When this option is selected, and Keyframe Rate is set to the composition frame rate, a keyframe is added at each video field. Select this option for animated masking for interlaced video. If this option is not selected, the mask may slip off the object that you are attempting to key out. For more information about fields in interlaced video, see Interlaced video and separating fields.

Use Linear Vertex Paths Specifies that vertices in the first keyframe move along a straight path to their corresponding vertices in the second keyframe. Leave this option unselected if you want some vertices to interpolate along curved paths; for example, when the desired interpolation involves rotating parts. If this option is not selected, Smart Mask Interpolation creates a natural path for the mask.

Bending Resistance Specifies how susceptible the interpolated mask path is to bending instead of stretching. A value of 0 specifies that, as the mask path animates, it bends more than it stretches; a value of 100 specifies that the mask path stretches more than it bends.

Quality Specifies how strictly Smart Mask Interpolation matches vertices from one keyframe to another. A value of 0 specifies that a particular vertex in the first keyframe matches only the same-numbered vertex in the second keyframe. For example, the tenth vertex in the first keyframe must match the tenth vertex in the second keyframe. A value of 100 means that a vertex in the first keyframe can potentially match any vertex in the second keyframe. Higher values usually yield better interpolations; however, the higher the value, the longer the processing time.

Add Mask Path Vertices Specifies that Smart Mask Interpolation adds vertices to facilitate quality interpolations. In general, Smart Mask Interpolation works best when the mask paths have dense sets of vertices. Also, a vertex on the first mask path cannot match the middle of a curve or straight-line segment on the second mask path, so sometimes you must add vertices before matching to produce the desired result. Smart Mask Interpolation does not modify the original keyframes. Only the new mask path keyframes computed by Smart Mask Interpolation have additional vertices.

The value you set specifies how finely the input mask paths are subdivided. Pixels Between Vertices specifies the distance, in pixels, between vertices on the larger perimeter mask path after subdivision. Total Vertices specifies the number of vertices on the interpolated mask paths. Percentage Of Outline specifies that a vertex is added at each indicated percent of the mask path outline length. For example, a value of 5 means that a vertex is added at each successive segment of the outline that represents 5% of the total perimeter. To use only the vertices that were on the path at the first frame, do not select this option.

Note:

Smart Mask Interpolation may add vertices at existing vertex locations even if Add Mask Path Vertices is not selected. If two vertices on one mask path match a single vertex on the other, the single vertex is duplicated at the same location so that the segment between the two vertices shrinks to that location.

Matching Method Specifies the algorithm that Smart Mask Interpolation uses to match vertices on one mask path to vertices on the other. Auto applies the matching algorithm for curves if either of the two selected keyframes has a curved segment; otherwise, it applies the polylines algorithm. Curve applies the algorithm for mask paths that have curved segments. Polyline applies the algorithm for mask paths that have only straight segments.

Note:

The mask path keyframes added by Smart Mask Interpolation are polylines when Polyline Matching Method is selected, regardless of whether the input mask paths contained curved segments.

Use 1:1 Vertex Matches Specifies that Smart Mask Interpolation creates a vertex on one mask path that matches the same-numbered vertex on the other mask path. On each of the input mask paths, Smart Mask Interpolation matches the first vertices, the second vertices, the third vertices, and so forth. If the two paths have unequal numbers of vertices, this action may produce undesirable results.

First Vertices Match Specifies that Smart Mask Interpolation matches the first vertices in the two mask path keyframes. If not selected, Smart Mask Interpolation searches for the best first-vertex match between the two input mask paths.

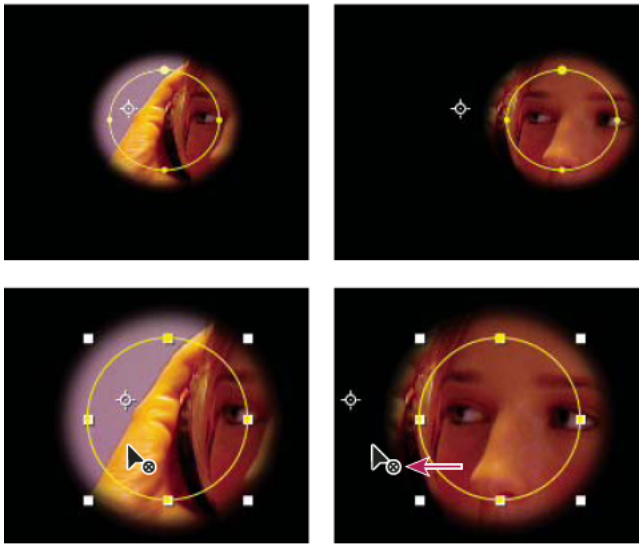
Note:

To ensure good results, make sure that the first vertices of the input mask paths match, and then select First Vertices Match.

Move a mask or pan a layer behind a mask

You can adjust the area that is visible through a mask by either moving the mask in the Layer or Composition panel or panning (moving) the layer behind the mask in the Composition panel. When you move a mask, the Position values of the masked layer remain constant, and the mask moves in relation to other objects in the Composition panel.

When you use the Pan Behind (Anchor Point) tool to pan a layer behind a mask, the position of the mask remains constant in the Composition panel but changes in the Layer panel. The Position values of the masked layer change in relation to the composition. As you pan past the edges of the layer frame, the Mask Path values on the layer also change. Using the Pan Behind (Anchor Point) tool saves steps; without it, you would have to change the Position and Mask Path properties of the masked layer manually. You can animate a layer panning behind another layer by setting keyframes for the Position and Mask Path properties of the masked layer.



When you use the Pan Behind (Anchor Point) tool in the Composition panel, After Effects automatically makes two adjustments. In the Layer panel, the mask is moved in relation to its layer (top), and in the Composition panel, the layer is moved in relation to the composition (bottom).

Move a mask

1. Select the mask or masks you want to move.
2. In the Composition panel, drag the mask or masks to a new location. To constrain the movement of the mask or masks to horizontal or vertical, hold down Shift after you start dragging.

Pan a layer behind its mask

1. Select the Pan Behind (Anchor Point) tool in the Tools panel.
2. Click inside the mask area in the Composition panel and drag the layer to a new position.

Face tracking and mask tracking

You can use the mask tracker to transform a mask so that it follows the motion of an object (or objects) in a movie. For more information, see Mask Tracking.Mask Tracking

You can also use the mask tracker to accurately detect and track human faces. For more information, see Face Tracking.

Expression access to path points on masks, Bezier shapes, and brush strokes

You can use expressions to read and write the x and y coordinates of path points, or vertices for:

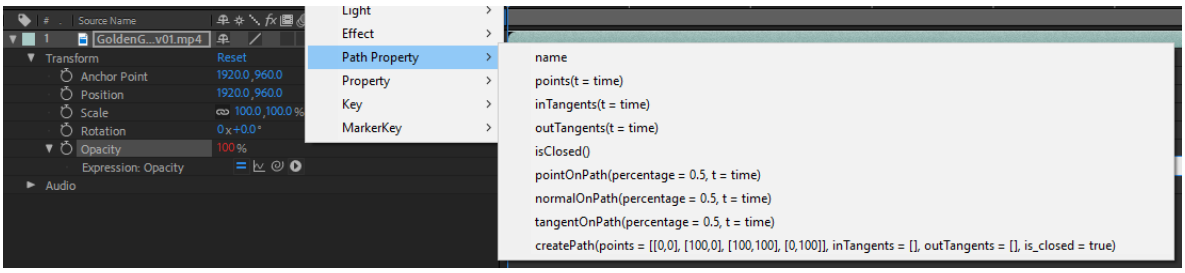
- Layer masks
- Bezier shapes
- Brush strokes on the Paint and Roto Brush & Refine Edge effects.

The expression methods are similar to accessing path vertices via scripting. The expression method is named points() instead of vertices() for familiarity.

Access expression methods

You can access the expression methods using the following steps:

1. To create a solid layer, select **Layer > Solid**.
2. Once you create a solid, create a mask. Click **Shape** tool, for example, a polygon, and create a mask over the solid layer.
3. In the **Timeline** panel, twirl open the **Mask** properties and alt-click **Mask Path**.
4. The expression field is displayed. In the **Timeline** panel, click the **Expression language menu** and choose **Path Property**.



Expression language menu

5. Select an expression method from the list of path point expression methods.

   To learn more about the expression methods, see Expression access to paths points on shapes, masks, and brush strokes (expression reference).

Listed below are example expression methods of the following path objects:

- Layer mask paths: *layer("Dark Gray Solid 1").mask("Mask 1").path or .maskPath*
- Bezier shape paths: *layer("Shape Layer 1").content("Shape 1").content("Path 1").path*
- Paint effect stroke paths: *layer("Dark Gray Solid 1").effect("Paint").stroke("Brush 1").path*
- Roto Brush & Refine Edge effect stroke paths: *layer("Dark Gray Solid 1").effect("Roto Brush & Refine Edge").stroke("Foreground 1").path*

Tips to work with these expression methods:

- Point and tangent values are returned as an array of [x,y] number pair arrays for the coordinates of the vertices. Coordinate values are rounded to four decimal places.
- Point and tangent arrays start with the first vertex on the path. You can change the first vertex of layer mask paths and Bezier shape paths using the **Layer > Mask and Shape Path > Set First Vertex** command.
- Coordinates for layer mask path points are relative to the layer's origin in its upper-left hand corner.
- Coordinates for Bezier shape path points are are relative to the anchor point of the path's shape group (ex., "Transform: Shape 1 > Anchor Point").
- Coordinates for brush stroke path points are relative to the start of the stroke; the first point is [0,0].
- The toComp() method, or other layer space transform methods, can be useful to convert coordinates from different layers into a common space or simply return the coordinates relative to the composition space.
- Because Bezier shape paths are relative to the anchor point of their local shape group and not the layer, their values may be offset from where you expect them to be. To work around this, set all Transform properties in the shape group to zero. Keep in mind that converting a parametric shape to a Bezier shape may affect the shape group's position.

- The createPath() method can be passed points, tangents, and isClosed methods of the same path or other paths. You can pass these methods unchanged to duplicate a path, or transform the point and tangent values before passing them to modify or animate the path.

Create Nulls from Paths panel

Create Nulls From Paths scriptUI panel allows you to create intuitive animations driven by expressions, without manually writing expressions. You can directly link different paths to shapes, shapes to solids, etc. The **Create Nulls From Paths** panel uses expression access to path points to automatically link the nulls, so that you don't have to write the expression yourself.

The panel creates nulls for each path point on a mask path or Bezier shape path. You can use the following buttons in the panel to direct how the nulls perform:

- **Points Follow Nulls:** The button creates nulls that control the position of path points. The path points are attached to nulls and you can animate the nulls to drive the path points.
- **Nulls Follow Points:** The button creates nulls that are controlled by the position of path points. The nulls are attached to path points and you can animate the path points to move the nulls.
- **Trace Path:** The button creates a single null that follows the path. The position of the null is linked to the coordinates of the path. The rotation of null auto-orients to follow the path. Trace Path controls the movement of the null along the path and whether it loops. By default, keyframes are set to trace the path in 1 second, and loop is enabled.

Work with the panel

1. To open the panel, select **Windows > Create Nulls From Paths.jsx.**
2. To add a shape mask, select **Layer > New > Shape Layer**. Add a shape mask to the layer.

   Note:

   The panel works with Bezier shapes, so all the parametric shapes such as rectangle, ellipse, and star, must be converted to a Bezier shape. To convert a parametric shape to Bezier shape, twirl open the shape layer and right-click the shape path for example, ***Rectangle 1****, and select* ***Convert To Bezier Path****.*

   Repeat step 2 to add more shapes.
3. Every Bezier shape and mask has a path. In the Timeline panel, twirl open the layers to view the paths. If you want nulls to follow path points, select a path in the Timeline panel, and click **Nulls Follow Points** in the **Create Nulls from Paths** panel**.**

   The script generates a null for every point on the path. You can delete any nulls you don't need.

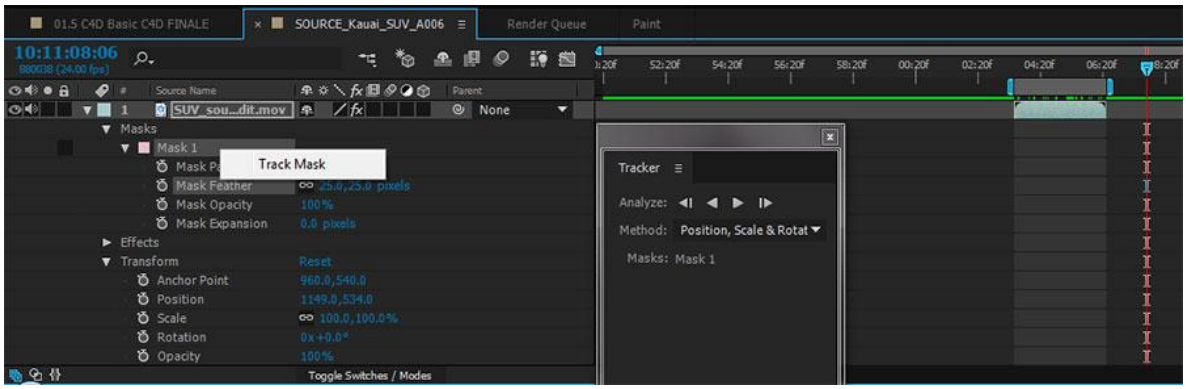
   Note:

   When you convert a parametric shape to a Bezier shape, After Effects adjusts the Position property of the shape. This causes an offset when the position of the nulls is calculated. To avoid the issue, set the value of the Transform property of a shape such as Transform: Ellipse 1 to zero before creating nulls.
4. If you want the path points to follow nulls, select a path in the Timeline panel. And click **Points Follow Nulls** in the **Create Nulls From Paths** panel.
5. Once you create nulls for all path points, you can attach them with each other to create animations. Nulls created with **Points Follow Nulls button** andnulls created with **Nulls Follow Points** have different colors**.** To attach nulls, select a null and hold down Shift as you use the pickwhip to select a parent layer and have the null's coordinates to jump to the parent layer.

   After you attach all the nulls together, preview your animation to see how it works.

Mask Tracking

The mask tracker transforms a mask so that it follows the motion of an object (or objects) in a movie. You usually create and use masks to hide clips from the final output, select a part of the image or video to apply effects, or combine clips from different sequences.



To use the mask tracker, select a mask and click the **Mask Path** setting under the mask. Right-click the selected mask and select **Track Mask** to begin tracking a mask.

When a mask is selected, the **Tracker** panel switches to mask tracking mode, and displays the following controls:

- Track forward either one frame at a time or until the end of the layer.
- Track backward either one frame at a time or until the end of the layer.
- Different methods with which you can choose to modify position, scale, rotation, skew, and perspective of the mask.

If the **Tracker** panel is not displayed, select a mask and go to **Animation** > **Track Mask** to display the panel. You can also context-click a mask and choose **Track Mask** from the context menu.

The result of using the mask tracker can be seen in the application of keyframes for the **Mask Path** property; the mask shape matches the transformations tracked in the layer, depending on the type of method that is chosen.

Other considerations when using the mask tracker

- For effective tracking, the tracked object must maintain the same shape throughout the movie, though the position, scale, and perspective of the tracked object can change.
- You can select multiple masks before beginning the tracking operation, and keyframes are then added to the Mask Path property for each selected mask.
- The layer being tracked must be a track matte, an adjustment layer, or a layer with a source that can contain motion. This includes layers based on video footage and precompositions, but not solid-color layers or still images.

The mask tracking analysis searches for content inside the mask. Use the **Mask Expansion** property to expand or contract the area of the mask.

How to use the Track Mask effect (Learn tutorial)

Watch this tutorial to learn how to use the Track Mask effect in After Effects to add and shape mask elements that move accurately through your Premiere Pro sequence.

How to use the Mask Tracker (Learn tutorial)

See this tutorialto learn how to use the mask tracker in After Effects.

Shape attributes, paint operations, and path operations for shape layers

Adding attributes to shape layers

After a shape layer has been created, you can add attributes—paths, paint operations, and path operations—by using the Add menu in the Tools panel or in the Timeline panel.

By default, the new attributes are inserted into the selected shape group or groups according to the following rules:

- New paths are added below existing paths and groups.
- New path operations—such as Zig Zag and Wiggle Paths—are added below existing path operations. If no path operations are present, new path operations are added below existing paths.
- New paint operations—strokes and fills—are added below existing paths and above existing strokes and fills.

To override these rules and place a new attribute at the end of the group, below all attributes, hold the Alt (Windows) or Option (Mac OS) key as you click to choose an item from the Add menu.

The Repeater operation is always added at the end of the group.

Strokes and fills for shapes

Andrew Devis shows how to modify gradient fills and strokes for shape layers, plus other options, in a video on the Creative COW website.

Strokes and fills for shapes are paint operations that add colored pixels to a path or to the area defined by a path. A stroke or a fill can consist of a solid color, or it can use a gradient of colors. Strokes can be continuous, or they can consist of a periodic series of dashes and gaps. Each stroke and fill has its own blending mode, which determines how it interacts with other paint operations in the same group.

By default, paint operations within a group are performed from the bottom to the top in the Timeline panel stacking order. This means, for example, that a stroke is rendered on top of (in front of) a stroke that appears after it in the Timeline panel. To override this default behavior for a specific fill or stroke, choose Above Previous In Same Group for the Composite property for the fill or stroke in the Timeline panel.

Note:

When you add a stroke or fill using the Add menu in the Tools panel or Timeline panel, the paint operation is added below existing paths and above existing strokes and fills. To place a new stroke at the end of the group, hold the Alt (Windows) or Option (Mac OS) key as you click to choose an item from the Add menu.

New shapes are created with fill and stroke properties depicted by the swatch buttons next to the underlined Fill and Stroke text controls in the Tools panel. You can also modify the fill colors, stroke colors, fill type, and stroke type for selected shapes using these controls. The Fill and Stroke controls are only visible in the Tools panel when a shape layer is selected or a drawing tool is active.

If multiple shapes are selected, with different fill or stroke properties, then the swatch button next to the Fill or Stroke control contains a question mark. You can still modify the fill and stroke properties using these controls, and the corresponding properties for all selected shapes are set to the same value.

Fills and strokes can be any of four types:

None No paint operation is performed.

Solid color The entire fill or stroke consists of one color.

Linear gradient The fill or stroke consists of colors and opacity values defined by a linear gradient and then mapped onto the composition along a single axis from the Start Point to the End Point.

Radial gradient The fill or stroke consists of colors and opacity values defined by a linear gradient, which are mapped onto the composition along a radius extending outward from the Start Point at the center to the End Point at the circumference of a circle. You can offset the starting point by modifying the Highlight Length and Highlight Angle values.

You can animate and interpolate gradients by adding keyframes to the Colors property and using the Color Picker in Gradient Editor mode to add, modify, and remove color stops and opacity stops. You can also save gradients as animation presets. (See Save an animation preset.)

The colors of strokes and fills for shape layers are not rendered as high-dynamic range colors. Color values under 0.0 or over 1.0 are clipped to fall within the range of 0.0 to 1.0.

Choose stroke or fill type and blending options

- To choose a fill type or stroke type for new shapes, or set the blending mode or opacity for a fill or stroke for new shapes, click the underlined Fill or Stroke text control in the Tools panel. To cycle through fill types or stroke types for existing shapes, select the shapes before using these controls.
- To cycle through fill types or stroke types for new shapes, Alt-click (Windows) or Option-click (Mac OS) the swatch button next to the underlined Fill or Stroke text control in the Tools panel. To choose a fill type or stroke type for existing shapes, select the shapes before using these controls.

Choose a solid color or edit a gradient for a stroke or fill

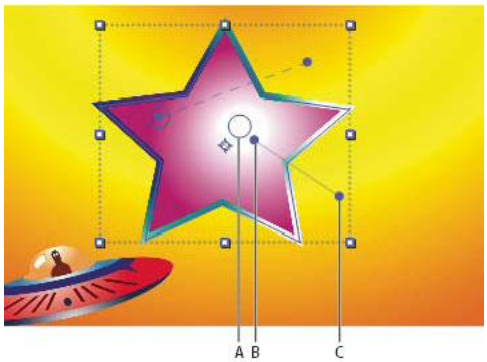
- To choose a solid color or gradient for fills or strokes for new shapes, click the swatch button next to the underlined Fill or Stroke text control in the Tools panel. To choose a solid color or gradient for fills or strokes for existing shapes, select the shapes before using the controls.

Modify the color mapping for a gradient

A gradient is a range of color and opacity values that you can customize in the Gradient Editor dialog box. You can also customize how those colors are applied to a stroke or fill by modifying the Start Point and End Point, which determine the direction and scale of the gradient. For example, you can modify these points to stretch the colors of a gradient over a larger area, or orient a linear gradient so that colors fade from top to bottom instead of from left to right. For a radial gradient, you define the center of gradient, its radius, and the offset of a highlight.

By default, when you create a shape path by drawing with the Pen tool, the control points for the gradient are placed in the center of the layer. You can adjust these points after you finish drawing.

You can modify the Start Point, End Point, Highlight Angle, and Highlight Length properties in the Timeline panel. You can also modify these properties directly in the Composition panel.



Controls for mapping gradient colors in Composition panel
***A** Highlight control point **B** Start Point **C** End Point*

1 Select the group in which the gradient is contained.

2 With the Selection tool active, drag the Start Point, End Point, or Highlight controls in the Composition panel.

The Selection tool turns to a gradient control pointer or when placed over a gradient control.

Set stroke width

- To set stroke width for new shapes in pixels (px), drag the underlined Stroke Width control (which is located to the right of the Stroke controls in the Tools panel), or click the control and enter a value in the box. To set the stroke width for existing shapes, select them before using the Stroke Width control.

Create a dashed stroke

You create a dashed stroke by adding any number of dashes and gaps to the Dashes property group for the stroke. The dashes and gaps in this property group are repeated as many times as necessary to cover the entire path. The Offset property determines at what point on the path the stroke begins.

Animate the Offset property to create a moving trail of dashes, like the lights on a marquee.

1 Expand the property group for a stroke in the Timeline panel.

2 Click the Add A Dash Or Gap button to add a dash and gap to one cycle of the dashed-line pattern. You can add up to three dashes for each stroke pattern.

3 Modify the Dash and Gap properties to make the dashes and gaps the lengths that you want.

Line Cap options for strokes

The Line Cap property for a dashed stroke determines the appearance of the ends of the stroke segments (dashes).

Butt Cap The stroke ends at the end of the path.

Round Cap The stroke extends beyond the end of the path for a number of pixels equal to the stroke width in pixels. The cap is a semicircle.

Projecting Cap The stroke extends beyond the end of the path for a number of pixels equal to the stroke width in pixels. The end is squared off.

Line Join options for strokes

The Line Join property for a stroke determines the appearance of the stroke where the path suddenly changes direction (turns a corner).

Miter Join A pointed connection. The Miter Limit value determines the conditions under which a beveled join is used instead of a miter join. If the miter limit is 4, then when the length of the point reaches four times the stroke weight, a bevel join is used instead. A miter limit of 1 causes a bevel join.

Round Join A rounded connection.

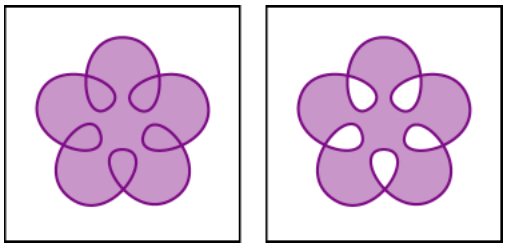
Bevel Join A squared-off connection.

Fill rules for shapes

A fill operation works by painting color in the area defined as inside a path. Determining what is considered *inside* a path is easy when the path is something simple, like a circle. However, when a path intersects itself, or when a compound path consists of paths enclosed by other paths, determining what is considered *inside* is not as easy.

After Effects uses one of two rules to determine what is considered *inside* a path for the purpose of creating fills. Both rules count the number of times that a straight line drawn from a point crosses the path on its way out of the area surrounded by a path. The nonzero winding fill rule considers path direction; the even-odd fill rule does not.

After Effects and Illustrator use the nonzero winding fill rule as the default.



Self-intersecting path with Fill Rule set to Non-Zero Winding Fill Rule (left) compared with Even-Odd Fill Rule (right)

Even-odd fill rule If a line drawn from a point in any direction crosses the path an odd number of times, then the point is inside; otherwise, the point is outside.

Nonzero winding fill rule The crossing count for a line is the total number of times that the line crosses a left-to-right portion of the path minus the total number of times that the line crosses a right-to-left portion of the path. If a line drawn in any direction from the point has a crossing count of zero, then the point is outside; otherwise, the point is inside.

A more intuitive way to think of the nonzero winding rule is to think of a path as a loop of string. A point is considered outside the path if you can put your finger at that point and then pull the string away without it being caught, wrapped around your finger.

Because the nonzero winding fill rule takes path direction into account, using this fill rule and reversing the direction of one or more paths in a compound path is useful for creating holes in compound paths.

To reverse the direction of a path, click the Reverse Path Direction On button for the path in the Timeline panel.

Alter shapes with path operations

Path operations are similar to effects. These live operations act nondestructively on a shape's path to create a modified path that other shape operations (such as fills and strokes) can apply to. The original path is not modified. Because path operations are live, you can modify or remove them at any time. Path operations apply to all paths above them in the same group; as with all shape attributes, you can reorder path operations by dragging, cutting, copying, and pasting in the Timeline panel.

1. In the Composition panel or Timeline panel, select the shape group into which to add the path operation.
2. Choose a path operation from the Add menu in the Tools panel or the Timeline panel:

   Merge Paths Combines paths into a compound path. (See Merge Paths options.)

   Offset Paths Expands or contracts a shape by offsetting the path from the original path. For a closed path, a positive Amount value expands the shape; a negative Amount value contracts it. The Line Join property specifies the appearance of the path where offset path segments come together. A bevel join is a squared-off connection. A miter

join is a pointed connection. The miter limit determines the conditions under which a beveled join is used instead of a miter join. If the miter limit is 4, then when the length of the point reaches four times the stroke weight, a bevel join is used instead. A miter limit of 1 causes a bevel join.

Pucker & Bloat Pulls the vertices of a path outward while curving the segments inward (Pucker), or pulls the vertices inward while curving the segments outward (Bloat).

Repeater Creates multiple copies of a shape, applying a specified transformation to each copy. (See Using the Repeater to replicate shapes.)

Round Corners Rounds corners of paths. Higher Radius values cause greater roundness.

Trim Paths Animate the Start, End, and Offset properties to trim a path to create results similar to results achieved with the Write-on effect and the Write On setting for paint strokes. If the Trim Paths path operation is below multiple paths in a group, then you can choose to have the paths trimmed simultaneously or treated as a compound path and trimmed individually.

Aharon Rabinowitz provides a video tutorial on the Creative COW website that shows how to use the Trim Paths operation to animate a dashed line following a path on a map.

Twist Rotates a path more sharply in the center than at the edges. Entering a positive value twists clockwise; entering a negative value twists counterclockwise.

Wiggle Paths Randomizes (wiggles) a path by converting it into a series of jagged peaks and valleys of various sizes. The distortion is auto-animated, meaning that it changes over time without the need to set any keyframes or add expressions.

Several properties for this path operation behave the same as properties of the same name for the Wiggly selector for text animation. (See Wiggly selector properties.) The Correlation property specifies the amount of similarity between the movement of a vertex and that of its neighbors; smaller values create more jagged results, as the position of a vertex depends less on the position of its neighbors. The Correlation property is similar to Correlation for the Wiggly selector, except that the Wiggle Paths version specifies the correlation between neighboring vertices instead of neighboring characters. Set the maximum length for segment paths using an absolute or relative size. Set the density of jagged edges (Detail) and choose between soft edges (Smooth) or sharp edges (Corner).

Animate the Size property to fade the wiggling up or down. To smoothly accelerate or decelerate the wiggling, set Wiggles/Second to a constant value of 0, and animate the Temporal Phase property.

Wiggle Transform Randomizes (wiggles) any combination of the position, anchor point, scale, and rotation transformations for a path. Indicate the desired magnitude of the wiggle for each of these transformations by setting a value in the Transform property group that is contained in the Wiggle Transform property group. The wiggled transformations are auto-animated, meaning that they change over time without the need to set any keyframes or add expressions. The Wiggle Transform operation is especially useful following a Repeater operation, because it allows you to randomize the transformations of each repeated shape separately. (See Using the Repeater to replicate shapes.)

Several properties for this path operation behave the same as properties of the same name for the Wiggly selector for text animation. (See Wiggly selector properties.) The Correlation property specifies the amount of similarity between the wiggled transformations of a repeated shape and its neighbor within a set of repeated shapes. Correlation is only relevant if a Repeater operation precedes the Wiggle Transform operation. When Correlation is 100%, all repeated items are transformed in the same way; when Correlation is 0%, all repeated items are transformed independently.

When randomizing repeated shapes keep the following in mind: If the Wiggle Transform path operation precedes (is above) the Repeater path operation, then all of the repeated shapes will be wiggled (randomized) in the same way. If the Repeater path operation precedes (is above) the Wiggle Transform path operation, then each of the repeated shapes will be wiggled (randomized) independently.

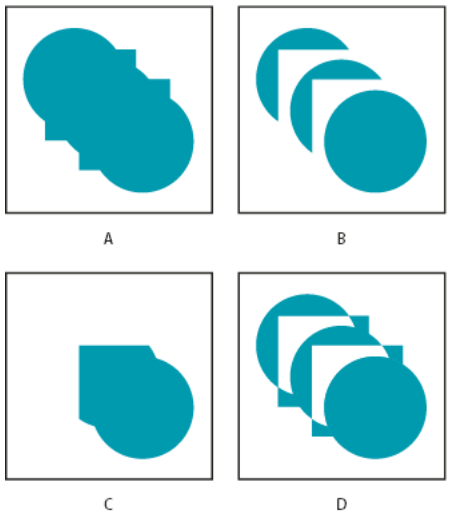
Chris Meyer provides a video tutorial on the ProVideo Coalition website that shows how to use the Wiggle Transform path operation. This tutorial explains why you must use multiple instances of the Wiggle Transform path operation if you want to wiggle multiple properties independently.

Andrew Devis shows how to use the Wiggle Transform path operation in a video on the Creative COW website.

Zig Zag Converts a path into a series of jagged peaks and valleys of uniform size. Set the length between peaks and valleys using an absolute or relative size. Set the number of ridges per path segment, and choose between wavy edges (Smooth) or jagged edges (Corner).

Merge Paths options

The Merge Paths path operation takes all of the paths above it in the same group as input. The output is a single path that combines the input paths. The input paths are still visible in the Timeline panel, but they are essentially removed from the rendering of the shape layer, so they don't appear in the Composition panel. A fill and stroke are added after the Merge Paths property group in the Timeline panel if a fill and stroke are not already present; otherwise, the output path wouldn't be visible.



Merge Paths options
***A** Add for all shapes **B** Subtract for squares **C** Intersect for squares **D** Exclude Intersections for squares*

The Merge Paths path operation has the following options, each of which performs different calculations to determine the output path:

Merge Merges all input paths into a single compound path. This option is the default used for shapes created from text characters made up of multiple paths, like the letter *e*, when using the Create Shapes From Text command.

Add Creates a path that encompasses the union of the areas of the input paths.

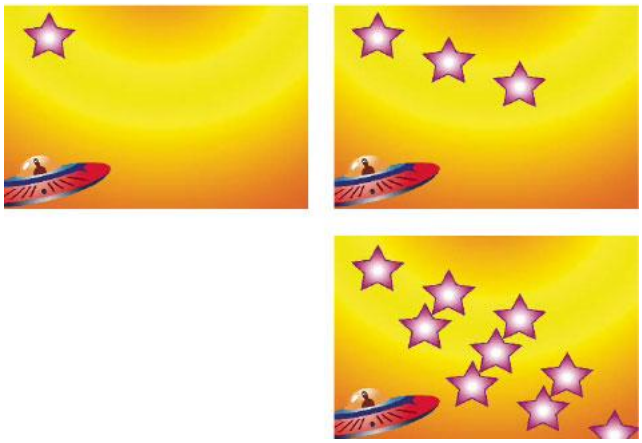
Subtract Creates a path that encompasses only the areas defined by the topmost path, subtracting the area defined by underlying paths.

Intersect Creates a path that encompasses only the areas defined by intersections between all input paths.

Exclude Intersections Creates a path that is the union of the areas defined by all input paths, minus the areas defined by intersections between all input paths.

Using the Repeater to replicate shapes

The Repeater path operation creates virtual copies of all paths, strokes, and fills above it in the same group. The virtual copies are not represented by separate entries in the Timeline panel, but they are rendered in the Composition panel. Each copy is transformed according to its order in the set of copies and the values of the properties in the Transform property group for that instance of the Repeater.



Original shape (upper-left), one instance of the Repeater operation applied (upper-right), and two instances of the Repeater operation applied (lower-right)

If the original shape is numbered 0, the next copy is numbered 1, and so on, then the result of the Repeater is to apply each transformation in the Transform property group n times to copy number n.

Consider the example of the Repeater applied to a shape with the Copies value set to 10 and the Position property in the Transform property group for the Repeater set to (0.0, 8.0). The original shape remains in its original position, (0.0, 0.0). The first copy appears at (0.0, 8.0), the second copy appears at (0.0, 16.0), the third copy appears at (0.0, 24.0), and so on, until the ninth copy at (0.0, 72.0), for a total of ten shapes.

You can apply multiple instances of the Repeater within the same group. In other words, you can repeat the Repeater. Using multiple instances of the Repeater is an easy way to create a grid of virtual copies of a single shape: just set the Position property for one instance of the Repeater to modify the horizontal values, and another instance to modify vertical values.

The Offset property value is used to offset the transformations by a specific number of copies. For example, if the Copies value is 10 and the Offset value is 3, then the original shape is transformed by 3 times the amount specified in the Transform property group, and the last copy is transformed by 12 times the amount specified in the Transform property group.

Animating the Offset property is a good way to easily create interesting results.

The Composite option determines whether copies are rendered above (in front of) or below (behind) the copies that precede them.

Use the Start Opacity value to set the opacity of the original shape, and the End Opacity value to set the opacity for the last copy. Opacity values for copies in between are interpolated.

If you place the Repeater after a path, above the fill and stroke property groups for a shape, then the set of virtual copies is filled or stroked as a compound path. If you leave the Repeater below the fill and stroke, then each copy is filled and stroked individually. The difference is most apparent with gradient fills and strokes.

Add a Wiggle Transform path operation after a Repeater operation to randomize (wiggle) the position, scale, anchor point, or rotation of the repeated copies within an instance of the Repeater. If the Wiggle Transform path operation precedes (is above) the Repeater path operation, then all of the repeated shapes will be wiggled (randomized) in the same way. If the Repeater path operation precedes (is above) the Wiggle Transform path operation, then each of the repeated shapes will be wiggled (randomized) independently.

Eran Stern provides a video tutorial on the Creative COW website that shows how to use the Repeater operation.

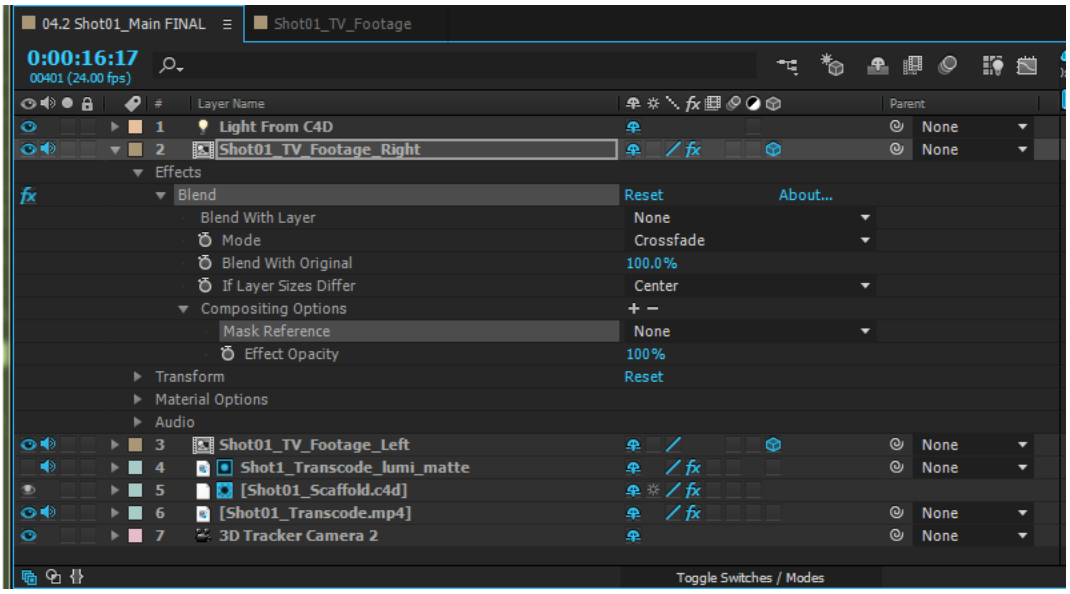
Chris Zwar provides an example project on his website that uses the Card Dance effect and a shape layer with the Repeater operation to simulate a halftone color separation for any image or video.

Mask Reference

About Mask Reference

Use the new **Mask Reference** option to restrict the area of effects that is applied to a layer. The **Mask Reference** property is found under the **Compositing Options** under each effect in the **Timeline** panel.

Create a Mask Reference



Mask Reference

Click the '+' sign under the **Compositing Options** in the **Timeline** panel and choose a mask from the **Mask Reference** menu.

While creating a mask reference, keep in mind the following considerations :

- You can only choose a mask on the same layer as the effect.
- You can add as many mask references as you like.
- You can reference an existing mask.
- You cannot create a new mask from an After Effects effect.

When a mask is applied to a layer, a dynamic stream is created under the **Masks** options which shows the list of masks applied to a layer. When a new mask is created, this list is automatically updated.

Changes to a mask that is referenced by an effect will change where the effect is composited. For example, you can feather the mask or use per-vertex feathering to change the edge of the effect composite. Changing the opacity changes the overall intensity of the effect per for every mask.

You can also use mask modes and combine multiple masks to apply an effect only to the area of intersection of masks.

For more information, see the Mask modessection.

Effect masks and layer masks

An effect mask cannot be used to modify the alpha channel of a layer. Hence an effect mask cannot be used as a layer mask.

For more information about layer masks, see the Preparing and importing Photoshop filessection.

Learn tutorial

Watch this tutorial to learn how to limit an effect to a specific area using a mask on the layer, and change properties on a per-mask basis.

Chapter 10: Text

Creating and editing text layers

About text layers

You can add text to a composition using text layers. Text layers are useful for many purposes, including animated titles, lower thirds, credit rolls, and dynamic typography.

You can animate the properties of entire text layers or the properties of individual characters, such as color, size, and position. You animate text using text animator properties and selectors. 3D text layers can optionally contain 3D sublayers, one for each character. (See Animate text with text animatorsand Per-character 3D text properties.)

Text layers are synthetic layers, meaning that a text layer does not use a footage item as its source—though you can convert text information from some footage items into text layers. Text layers are also vector layers. As with shape layers and other vector layers, text layers are always continuously rasterized, so when you scale the layer or resize the text, it retains crisp, resolution-independent edges. You cannot open a text layer in its own Layer panel, but you can work with text layers in the Composition panel.

After Effects uses two kinds of text: point text and paragraph text. Point text is useful for entering a single word or a line of characters; paragraph text is useful for entering and formatting the text as one or more paragraphs.

Vertical and horizontal point text (left), and paragraph text in a bounding box (right)

You can copy text from other applications such as Adobe Photoshop, Adobe Illustrator, Adobe InDesign, or any text editor, and paste it into a text layer in After Effects. Because After Effects also supports Unicode characters, you can copy and paste these characters between After Effects and any other application that also supports Unicode (which includes all Adobe applications).

Text formatting is included in the Source Text property. Use the Source Text property to animate formatting and to change the characters themselves (for example, change the letter b to the letter c).

After Effects automatically synchronizes missing fonts using the available fonts. The Resolve Fonts dialog is displayed when you open a project that uses fonts that are not installed. If the fonts are available from Adobe, you can choose to have them automatically synced to your Creative Cloud account and installed. After Effects replaces fonts that are not available online with the default font.

Note:

With the April 2017 release of After Effects CC, installing After Effects does not install a set of fonts. The same fonts installed with previous versions of After Effects, such as Adobe Myriad Pro, are available as part of your Creative Cloud subscription through Adobe Fonts.

Sequential frames in which Source Text has been animated

Best practices for creating text and vector graphics for video

Text that looks good on your computer screen as you are creating it can sometimes look bad when viewed in a final output movie. These differences can arise from the device used to view the movie or from the compression scheme used to encode the movie. The same is true for other vector graphics, such as shapes in shape layers. In fact, the same problems can occur in raster images, but the small and sharp details of vector graphics cause the problems most often.

Keep in mind the following as you create and animate text and vector graphics for video:

- You should always preview your movie on the same kind of device that your audience use to view it, such as an NTSC video monitor. (See Preview on an external video monitor.)
- Avoid sharp color transitions, especially from one highly saturated color to its complementary color. Sharp color transitions are difficult for many compression schemes—such as the compression schemes in MPEG and JPEG standards—to encode. These compression schemes can cause visual noise near sharp transitions. For analog television, the same sharp transitions can cause spikes outside the allowed range for the signal, also causing noise.
- When text will be over moving images, make sure that the text has a contrasting border (such as a glow or a stroke) so that the text is still readable when something the same color as the fill passes behind the text.
- Avoid thin horizontal elements, which can vanish from the frame if they happen to be on an even scan line during an odd field, or vice versa. The height of the horizontal bar in a capital H, for example, should be three pixels or greater. You can thicken horizontal elements by increasing font size, using a bold (or faux bold) style, or applying a stroke. (See Formatting characters with the Character panel.)
- When animating text to move vertically—for scrolling credits, for example—move the text vertically at a rate in pixels per second that is an even multiple of the field rate for the interlaced video format. Such a rate of movement prevents a kind of twitter that can come from the text movement being out of phase with the scan lines. For NTSC, good values include 0, 119.88, and 239.76 pixels per second; for PAL, good values include 0, 100, and 200 pixels per second.

Apply the Autoscroll - Vertical animation preset in the Behaviors category to quickly create a vertical text crawl (for example, a credit roll).

- To avoid the risk of twitter that comes with vertical motion, thin graphical elements, and fields, consider presenting credits as a sequence of blocks of text separated by transitions, such as opacity fades.

Fortunately, many problems with text in video and compressed movie formats can be solved with one simple technique: Apply a blur to the text layer. A slight blur can soften color transitions and cause thin horizontal elements to expand. The Reduce Interlace Flicker effect works best for the purpose of reducing twitter; it applies a vertical directional blur but doesn't blur horizontally, so it degrades the image less than other blurs.

Philip Hodgetts provides tips on the Creative COW website for getting the best results when creating text or vector graphics for video.

Scripts and expressions for working with text

This section documents scripting methods for working with text, and includes links to popular scripts and tutorials.

Create one or multiple text layers based on the contents of a text file

Christopher Green provides a script (crg_Text_from_File.jsx) on his website that allows you to create one text layer from all of the text, or you can create one layer for each line in the text file. The script also provides options for leading and other spacing.

Scripting access to text baselines

You can read the baseline (x,y) locations for a text layer using scripting with the After Effects CC 2015 (13.6) update. The new sourceText.value.baselineLocs attribute for TextDocument objects returns an array of floats indicating the starting position of each line of text's baseline x and y value.

Line wraps in a paragraph text box are treated as multiple lines.

The array returns float values in the form of:

line0.start_x, line0.start_y, line0.end_x, line0.end_y, line1.start_x, line1.start_y, line1.end_x, line1.end_y … lineN-1.start_x, lineN-1.start_y, lineN-1.end_x, lineN-1.end_y

Note:

If a line has no characters, the x and y values for start and end are the maximum float value (3.402823466e+38F).

Scripting improvements for text layers

You can read additional information through scripting about the font and style used in a text layer, including the location of the font file on disk.

Following are the read-only attributes for the textDocument object:

- *fontLocation*: returns string with path of font file, providing its location on disk (not guaranteed to be returned for all font types; return value may be empty string for some kinds of fonts)
- *fontStyle*: returns string with style information —such as bold, or italic
- *fontFamily*: returns a string with the name of the font family

The value returned is for the first character in the text layer at the current time.

Edit source text of text layers

This script displays a palette for editing the text of text layers in an unstyled form. If your text layer uses a complex animation, or is difficult to access or is hidden at the current time, editing the text when not animated or style can be useful.

Download this script from Jeff Almasol's website: Redifinery.

Map text file to markers

This script maps lines from a text file as Source Text keyframes on the selected text layer at successive markers on the layer. You can control the text line to use by entering a line number as the marker's comment.

Download this script from Jeff Almasol's website: Redifinery.

Get smart

This script displays a palette with controls for fixing various “plain text” punctuation into their “smart” typographical representations (for example, (c) is converted to the copyright symbol, ©).

Download this script from Jeff Almasol's website: Redefinery.

Other scripts for working with text

Todd Kopriva provides an example script on the Adobe website that demonstrates the text formatting features available through the scripting interface.

Salahuddin Taha provides a script on the After Effects Scripts website that enables entry of Arabic text (which flows from right to left).

Michael Cardeiro provides a script on the After Effects Scripts website that makes multiple versions of your compositions using information from a spreadsheet or database. The script goes through your spreadsheet line by line, making a new version of your composition with text layers in the composition receiving text from the spreadsheet automatically.

The After Effects Scripts website provides many scripts for working with text. Paul Tuersley provides a script on the After Effects Scripts website that allows you to search for and edit text layers throughout your After Effects project, create your own text style presets, and apply them to multiple layers.

Paul Tuersley provides a script on the AE Enhancers forum for importing Substation Alpha (SSA) karaoke files and automatically creating animated text layers from them.

For examples of expressions for the Source Text property, see Writing expressions for source text and MarkerKey attributes (expression reference).

Enter point text

When you enter point text, each line of text is independent—the length of a line increases or decreases as you edit the text, but it doesn't wrap to the next line.

The small line through the type tool pointer marks the position of the text *baseline*. For horizontal text, the baseline marks the line on which the text rests; for vertical text, the baseline marks the center axis of the characters.

When you enter point text, it is created using the properties currently set in the Character panel. You can change these properties later by selecting the text and modifying settings in the Character panel.

1 Do one of the following to create a text layer:

- Choose Layer > New > Text. A new text layer is created and an insertion point for the Horizontal Type tool appears in the center of the Composition panel.
- Double-click a Type tool. A new text layer is created and an insertion point for the appropriate type tool appears in the center of the Composition panel.
- Select the Horizontal Type tool or the Vertical Type tool , and then click in the Composition panel to set an insertion point for the text.

Note:

The pointer for a type tool changes depending on whether it is over a text layer in the Composition panel. When the pointer is not directly over a text layer, it appears as a new text pointer ; click to create a new text layer. Shift-click always creates a new text layer.

2 Enter text characters by typing. Press Enter on the main keyboard (Windows) or Return (Mac OS) to begin a new line.

Note:

You can also choose Edit > Paste to paste text that you have copied from any application that uses Unicode characters. Text receives the formatting of the first character in the text layer into which it is pasted.

3 To end text-editing mode, press Enter on the numeric keypad, select another tool, or press Ctrl+Enter (Windows) or Command+Return (Mac OS).

Enter paragraph text

When you enter paragraph text, the lines of text wrap to fit the dimensions of the bounding box. You can enter multiple paragraphs and apply paragraph formatting.

You can resize the bounding box at any time, which causes the text to reflow within the adjusted rectangle.

When you enter paragraph text, it has the properties set in the Character and Paragraph panels. You can change these properties later by selecting the text and modifying settings in the Character and Paragraph panels.

1 Select the Horizontal Type tool or the Vertical Type tool .

2 Do one of the following in the Composition panel to create a text layer:

- Drag to define a bounding box from a corner.
- Alt-drag (Windows) or Option-drag (Mac OS) to define a bounding box around a center point.

Note:

The pointer for a type tool changes depending on whether it is over a text layer in the Composition panel. When the pointer is not directly over a text layer, it appears as a new text pointer ; drag to create a new text layer. Shift-drag always creates a new text layer.

3 Enter text by typing. Press Enter on the main keyboard (Windows) or Return (Mac OS) to begin a new paragraph. Press Shift+Enter on the main keyboard (Windows) or Shift+Return (Mac OS) to create a soft carriage return, which begins a new line without beginning a new paragraph. If you enter more text than can fit in the bounding box, the overflow icon ⊞appears on the bounding box.

Note:

You can also choose Edit > Paste to paste text that you have copied from any application that uses Unicode characters. Text receives the formatting of the first character in the text layer into which it is pasted.

4 To end text-editing mode, press Enter on the numeric keypad, select another tool, or press Ctrl+Enter (Windows) or Command+Return (Mac OS).

Select and edit text in text layers

You can edit text in text layers at any time. If you set the text to follow a path, designate it as a 3D layer, transform it, or animate it, you can still continue to edit it. Before you can edit text, you must select it.

To disable the Path Options property group for a text layer, click the visibility (eyeball) switch for the Path Options property group. Temporarily disabling the Path Options property group can make editing and formatting text easier.

The pointer for a type tool changes, depending on whether it is over a text layer in the Composition panel. When the pointer for a type tool is directly over a text layer, it appears as the edit text pointer ; click to place the insertion point in the existing text.

? To select text with a type tool, do one of the following:

- To select a range of text, drag over the text.
- To select a range of text, click, move the pointer, and then Shift-click.
- To select a word, double-click it. To select a line, triple-click it. To select a paragraph, quadruple-click it. To select all text in a layer, quintuple-click anywhere in the text.
- To use the arrow keys to select text, hold down Shift and press the Right Arrow or Left Arrow key. To use the arrow keys to select words, hold down Shift+Ctrl (Windows) or Shift+Command (Mac OS) and press the Right Arrow or Left Arrow key.

To select all text in a text layer and activate the most recently used type tool, double-click the text layer in the Timeline panel.

Online resources for selecting and editing text in text layers

Jeff Almasol provides a script on his redefinery website for editing the source text of text layers.

Jeff Almasol provides a script on his redefinery website that converts various plain text punctuation into their "smart" typographical representations (for example, *(c)* is converted to the copyright symbol, ©).

Jeff Almasol provides a script on his redefinery website that sets keyframes for the Source Text property of a text layer and sets the values to text from a text file; the keyframes are placed at times specified by layer markers on the text layer.

Resize a text bounding box

1 With a type tool active, select the text layer in the Composition panel to display the bounding box handles.

2 Position the pointer over a handle—the pointer turns into a double arrow —and do one of the following:

- Drag to resize in one direction.
- Shift-drag to maintain the proportion of the bounding box.
- Ctrl-drag (Windows) or Command-drag (Mac OS) to scale from the center.

Move a text layer

You can drag with the move pointer in the Composition panel to move a text layer. To activate the move pointer without leaving text editing mode, move the type tool away from the text in the Composition panel; when you see the move pointer , drag to move the text. You can also hold down the Ctrl (Windows) or Command (Mac OS) key to momentarily activate the move pointer.

Convert point or paragraph text

Note:

When you convert paragraph text to point text, all characters outside the bounding box are deleted. To avoid losing text, resize the bounding box so that all text is visible before conversion.

1 Using the Selection tool , select the text layer.

Note:

You can't convert the text layer if it's in text-editing mode.

2 Using a type tool, right-click (Windows) or Control-click (Mac OS) anywhere in the Composition panel, and choose Convert To Paragraph Text or Convert To Point Text.

When you convert from paragraph text to point text, a carriage return is added at the end of each line of text, except the last line.

To display the bounding box of paragraph text and automatically select a type tool, double-click the text layer in the Timeline panel.

Expanded text support

You can type and edit text in right-to-left writing styles such as Arabic, and Indic writing style such as Hindi.

Limitations of the right-to-left and Indic text

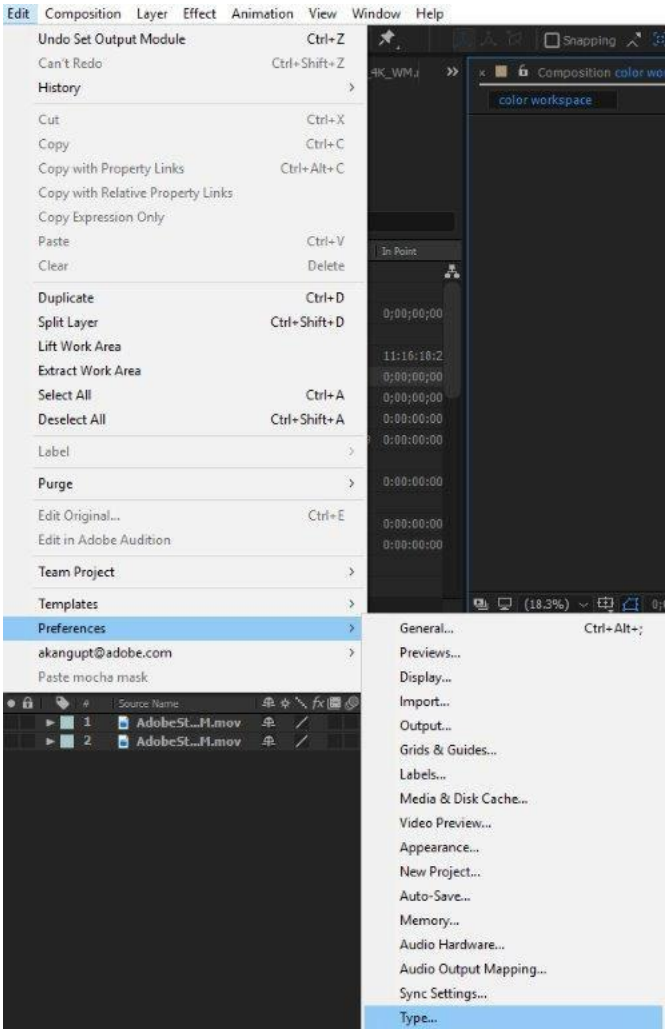
There are a few limitations to using right-to-left and Indic text systems:

- Per-character animation works left-to-right and does not work with glyph characters.

Enable right-to-left and Indic text

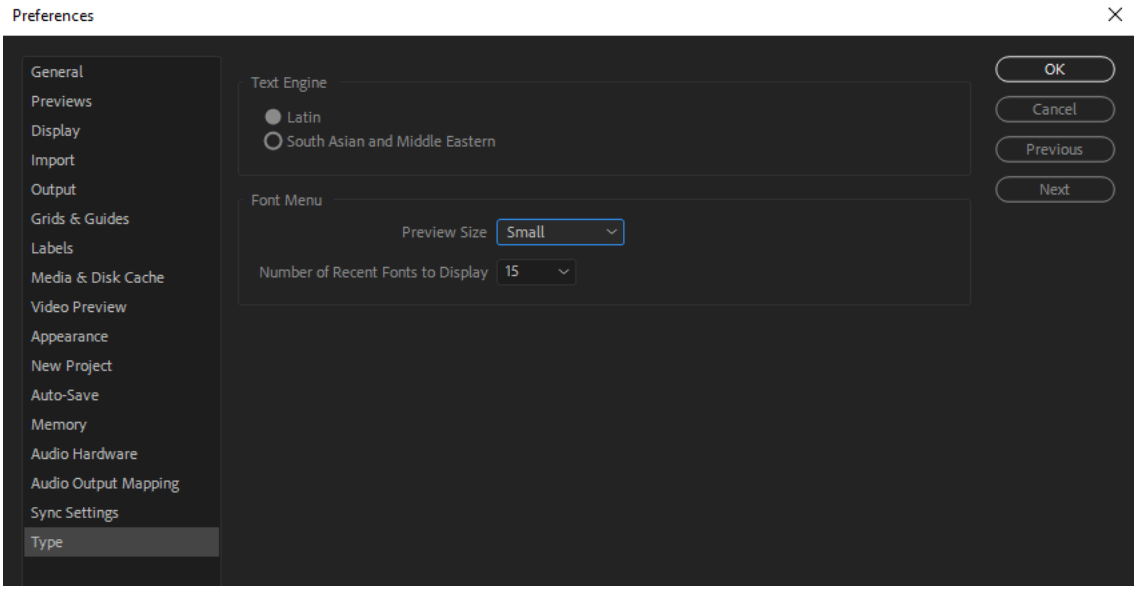
To enable right-to-left or Indic text, follow these steps:

1 Select **Preferences > Type**.



Selecting Preferences

2 In the **Preferences** dialog, change **Text Engine** to preferred language.



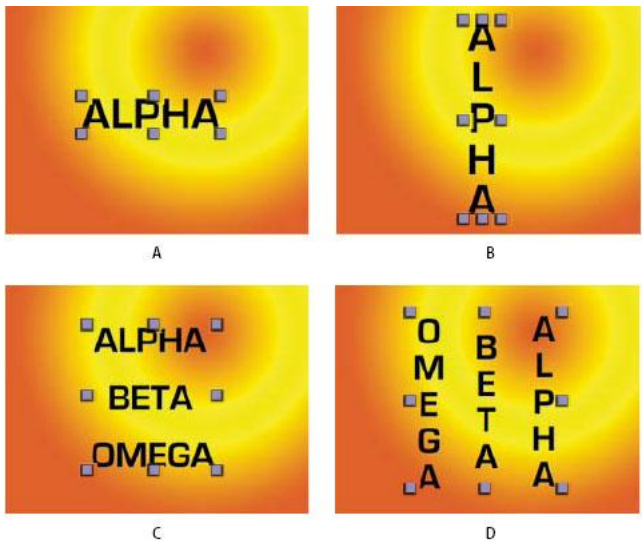
Changing Languages Selection

- **South Asian and Middle Eastern**: Works with right-to-left languages such as Arabic, Hebrew, and Indic languages.
- **Latin**: Works with other languages.

3 Restart After Effects to apply the changes.

Change the direction of text

Horizontal text flows from left to right; multiple lines of horizontal text lie from top to bottom. Vertical text flows from top to bottom; multiple lines of text lie from right to left.



A Horizontal point text B Horizontal point text converted to vertical C Horizontal paragraph text D Horizontal paragraph text converted to vertical

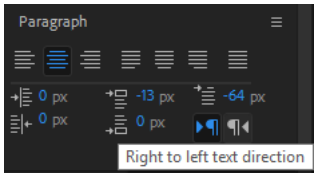
1 Using the Selection tool, select the text layer.

Note:

You can't convert text in text-editing mode.

2 Using a type tool, right-click (Windows) or Control-click (Mac OS) anywhere in the Composition panel, and choose Horizontal or Vertical.

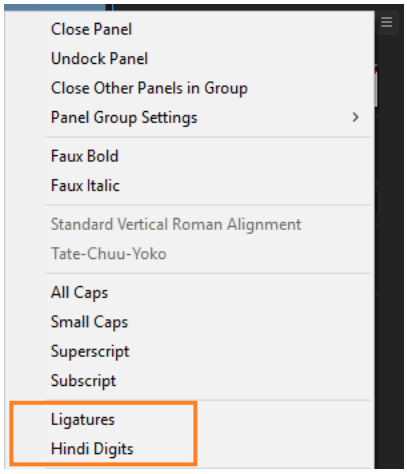
You can switch the text direction between left-to-right and right-to-left. To change the direction, click the text direction buttons in the **Paragraph** panel.



Change Text direction

Font ligatures

Ligatures are typographic replacement characters for certain letter pairs if they are available in a given Open Type font. You can use font ligatures by enabling the **Ligatures** option in the **Character** panel. After Effects has ligatures in many fonts for character combinations in different languages. You can also enable the option using the **Font Ligature** checkbox at the bottom of the **Character** panel.



Font ligatures

Hindi digits

You can use Hindi digits use enabling the **Hindi Digits** option in the **Character** panel. You can also enable the option using the **Hindi Digits** checkbox at the bottom of the **Character** panel.

Convert text from Photoshop to editable text

Text layers from Photoshop retain their style and remain editable in After Effects.

If you imported the Photoshop document as merged layers, then you must first select the layer and choose Layer > Convert To Layered Comp to decompose the imported Photoshop document into its layers.

1 Add the Photoshop text layer to your composition and select it.

2 Choose Layer > Convert To Editable Text.

The layer becomes an After Effects text layer and no longer uses the Photoshop text layer as its source footage item.

If the layer contains layer styles, the layer styles are converted to editable layer styles as if the Layer > Layer Styles > Convert To Editable Styles command had been used on the layer before converting the text to editable text.

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Formatting characters and the Character panel

After Effects offers a wide range of creative options for formatting and customizing text. Use the Character panel to format characters. If text is selected, changes you make in the Character panel affect only the selected text. If no text is selected, changes you make in the Character panel affect the selected text layers and the text layer's selected Source Text keyframes, if any exist. If no text is selected and no text layers are selected, the changes you make in the Character panel become the new defaults for the next text entry.

- To display the Character panel, choose Window > Character; or, with a type tool selected, click the panel button in the Tools panel.

To open the Character and Paragraph panels automatically when a type tool is active, select Auto-Open Panels in the Tools panel.

- To reset Character panel values to the default values, choose Reset Character from the Character panel menu.

Note:

You open the panel menu by clicking the panel menu button in the upper-right tab of the panel.

After Effects doesn't provide a character style for underlining text, but you can underline text with a variety of other graphical elements. Possibilities include using a shape layer containing a path with a stroke, applying a stroke to an open mask, using the Write-on Effect, and using an animated series of tightly spaced (kerned) underscore or dash characters. For a discussion of why underlining is considered bad typographic form and how you can create underlines in After Effects, see this post on the Creative COW After Effects forum.

Fonts

A font is a complete set of characters—letters, numbers, and symbols—that share a common weight, width, and style. In addition to the fonts installed on your system in the standard location for your operating system, After Effects uses font files in this local folder:

Windows Program Files\Common Files\Adobe\Fonts

Mac OS Library/Application Support/Adobe/Fonts

If you install a Type 1, TrueType, OpenType, or CID font into the local Fonts folder, the font appears in Adobe applications only.

If the formatting for a character specifies a font that is unavailable on your computer system, another font will be substituted, and the missing font name will appear in brackets. Font substitution sometimes occurs when you open a project on Mac OS that was created on Windows, because the set of default fonts differs between the two operating systems.

When you select a font, you can select the font family and its font style independently. The font family (or typeface) is a collection of fonts sharing an overall design; for example, Times. A font style is a variant version of an individual font in the font family; for example, regular, bold, or italic. The range of available font styles varies with each font. If a font doesn't include the style you want, you can apply faux styles—simulated versions of bold, italic, superscript, subscript, all caps, and small caps styles. If more than one copy of a font is installed on your computer, an abbreviation follows the font name: (T1) for Type 1 fonts, (TT) for TrueType fonts, or (OT) for OpenType fonts.

The font size determines how large the type appears in the layer. In After Effects, the unit of measurement for fonts is pixels. When a text layer is at 100% scale value, the pixel values match composition pixels one-to-one. So if you scale the text layer to 200%, the font size appears to double; for example, a font size of 10 pixels in the layer looks like 20 pixels in the composition. Because After Effects continuously rasterizes text, the resolution remains high when you increase the scale values.

Note:

When choosing fonts and styles from the menus in the Character panel, press Enter (Windows) or Return (Mac OS) to accept an entry, or press Esc to exit the menu without applying a change.

For information about what fonts are installed with Adobe Creative Cloud applications, and others available through Adobe, and how to install them, see these pages on the Adobe website:

- Creative Cloud Fonts FAQ

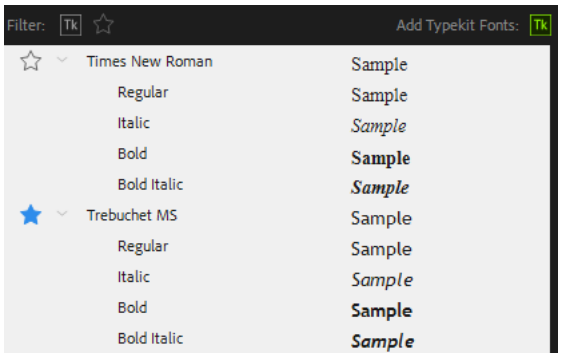
You can use the Adobe Font Finder on the Adobe website to browse and search fonts by various characteristics.

Font menu

You can use the **Font** menu in the **Character** panel to perform the following tasks:

Choose a font family

- Click in the Font menu, and begin typing the name. Continue typing until the desired font family name appears.
- To choose the previous or next font family in the menu, place the pointer over the Font menu and use your mouse scroll wheel; or click in the Font Family menu box, and press the Up Arrow or Down Arrow.
- Click the arrow to the right of the Font menu, and press the key for the first letter of the font family name. Press the key again to advance through the font families with names that begin with that letter.
- Set a style for the font family, for example - Regular, Italic, Bold, Light, and Oblique.



Font family in Font menu

Choose a font style

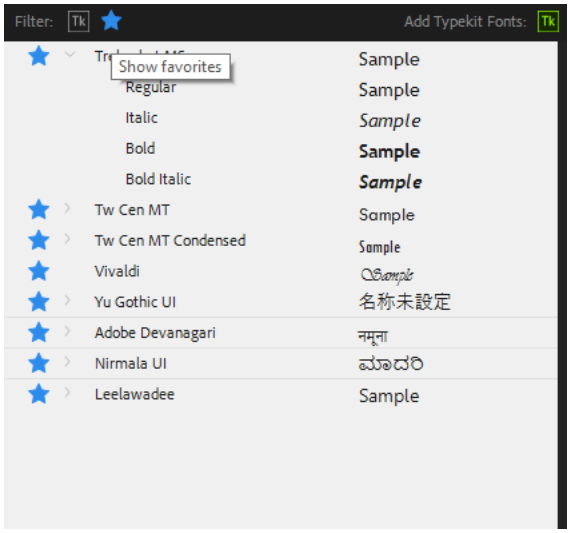
- Open the Font menu in the **Character** panel. You can use the font preview displayed next to the font to choose a font style.
- If the font family you chose does not include a bold or italic style, you can click the Faux Bold button **T** or the Faux Italic button *T* in the Character panel to apply a simulated style.

Choose a font size

Enter or select a new value for Size in the Character panel.

Set fonts as favorites

- To set a font as your favorite, click the star icon adjacent to the font.
- To display only favorite fonts, click the star icon on top of the Font menu.



Set fonts as favorites

Display only fonts downloaded from Adobe Fonts

To display only fonts downloaded from Adobe Font, click the fonts icon at the top of the **Font** menu.

Modify Font menu

- To change the size of of font preview, select **Edit** > **Preferences** > **Type**. Change the **Preview Size** value under **Font Menu**.
- To change the number of recent fonts to display at the top of the menu, select **Edit** > **Preferences** > **Type**. Change the **Number of Recent Fonts to Display** value under **Font Menu**.

Spacing between characters and lines: non-breaking spaces, kerning, tracking, and leading

Leading is the spacing between lines of text. Kerning is the process of adding or subtracting space between specific letter pairs. Tracking is the process of creating an equal amount of spacing across a range of letters. Positive kerning or tracking values move characters apart (increasing the spacing from the default); negative values move characters closer together (reducing the spacing from the default).

Tracking and manual kerning are cumulative, so you can first adjust individual pairs of letters and then tighten or loosen a block of text without affecting the relative kerning of the letter pairs.

Note:

Values for kerning and tracking affect Japanese text, but normally these options are used to adjust the aki (spacing) between Roman characters.

Create a non-breaking space

If a set of characters is set to be non-breaking, the characters animate together as if they were a single word.

1 Select the characters you want to prevent from breaking.

2 Choose No Break from the Character panel menu.

Note:

You open the panel menu by clicking the panel menu button in the upper-right tab of the panel.

Specify leading

? In the Character panel, do one of the following:

- Choose the desired leading from the Leading menu .
- Select the existing leading value, and enter a new value.
- Drag the underlined leading value.

Specify kerning

You can automatically kern type using metrics kerning or optical kerning. Metrics kerning uses kern pairs, which are included with most fonts. Kern pairs contain information about the spacing of specific pairs of letters such as *LA*, *To*, *Tr*, *Ta*, *Tu*, *Te*, *Ty*, *Wa*, *WA*, *We*, *Wo*, *Ya*, and *Yo*. After Effects uses metrics kerning by default so that specific pairs are automatically kerned when you import or type text. Some fonts include robust kern-pair specifications.

For fonts for which metrics kerning provides inadequate results, or for two different typefaces or sizes in a line, you may want to use the optical kerning option. Optical kerning adjusts the spacing between adjacent characters based on their shapes.

You can also use manual kerning to adjust the space between two letters.

Alan Shisko provides an article and video tutorial about kerning on his Motion Graphics 'n Such blog.

- To use the built-in kerning information for a font, choose Metrics from the Kerning menu in the Character panel.
- To adjust kerning manually, click between two characters with a type tool, and set a numeric value for Kerning in the Character panel.

Note:

If a range of text is selected, you can't manually kern the characters. Instead, use tracking.

Specify tracking

Tracking set to default value of 0 (left), Tracking set to -50 (center), and Tracking set to 200 (right)

- To specify tracking, set a numeric value for Tracking in the Character panel.

Text fills and strokes

For text, a fill is applied to the area inside the shape of an individual character; a stroke is applied to the outline of the character. After Effects applies a stroke to a character by centering the stroke on the character's path; half of the stroke appears on one side of the path, and the other half of the stroke appears on the other side of the path.

The Character panel lets you apply both color fill and color stroke to text, control the stroke width, and control the stacking position of the fill and stroke. You can change these properties for individual, selected characters; selected Source Text keyframes; all text in a layer; or all text across multiple selected layers.

You can also control the compositing order of the fill and stroke for a text layer using the All Fills Over All Strokes or All Strokes Over All Fills options, which override the Fill Over Stroke or Stroke Over Fill properties of individual characters.

Note:

For text that has per-character 3D properties, you cannot control the order of stroke and fill operations between characters; the Fill & Stroke menu in the More Options property group in the Timeline panel is unavailable, and the All Fills Over All Strokes and All Strokes Over All Fills options in the Character panel do nothing.

Add a stroke (outline) to text

1. Select the characters to which you want to add a stroke.
2. Set a stroke size with the Stroke Width property in the Character panel.
3. Set the stroke color with the Stroke Color control in the Character panel.
4. Choose one of the following in the Character panel to control the position of the stroke:

   Stroke Over Fill, Fill Over Stroke The stroke of only selected text appears over or behind the fill.

   All Strokes Over All Fills, All Fills Over All Strokes Strokes appear over or behind fills in the entire text layer.

Change text fill or stroke color

The text you enter gets its color from the Fill Color and Stroke Color controls in the upper-right corner of the Character panel. Select text to change its color after the text has already been entered.

- To set fill or stroke color using the color picker, click the Fill Color or Stroke Color control. To set fill or stroke color using the eyedropper, click the eyedropper button and then click anywhere on the screen to sample the color.
- To swap colors for fill and stroke, click the Swap Fill And Stroke button.
- To remove fill or stroke, click the No Fill Color button or No Stroke Button. Only one of these buttons is available, depending on whether the Fill Color or Stroke Color box is forward.
- To set the fill or stroke to black or white, click the Set To Black or Set To White button.
- To bring the Fill Color or Stroke Color box forward, click it.

Change text stroke line join

The line join type for a stroke determines the shape of the stroke when two segments of the stroke intersect. You set the line join type for a text stroke with the Line Join setting in the panel menu of the Character panel, which you open by clicking the panel menu button in the upper-right tab of the Character panel.

? Choose Miter, Round, or Bevel from the Line Join menu.

Blend overlapping characters in a text layer

1 In the Timeline panel, expand the text layer and the More Options group.

2 Choose a blending mode from the Inter-Character Blending menu.

Note:

To blend a text layer with the layers beneath it, specify a blending mode from the Modes column in the Timeline panel.

Inter-character blending is not available for text layers with per-character 3D properties.

Text scale and baseline shift

Horizontal scale and *vertical scale* specify the proportion between the height and width of the text. Unscaled characters have a value of 100%. You can adjust scale to compress or expand selected characters in both width and height.

Baseline shift controls the distance that text appears from its baseline, either raising or lowering the selected text to create superscripts or subscripts.

- To adjust scale, enter a new percentage for Horizontal Scale or Vertical Scale in the Character panel, or drag the underlined value.
- To specify baseline shift, set a value for Baseline Shift in the Character panel. A positive value moves horizontal text above and vertical text to the right of the baseline; a negative value moves text below or to the left of the baseline.

Change the case of text

You can enter or format text as uppercase characters, either all caps or small caps. When you format text as small caps, After Effects uses the small caps designed as part of the font, if they are available. If the font does not include small caps, After Effects generates faux small caps.

Note:

Small Caps formatting does not change characters that were originally typed in uppercase.

- Click the All Caps button or the Small Caps button in the Character panel.
- Choose All Caps or Small Caps from the Character panel menu.

Note:

You open the panel menu by clicking the panel menu button in the upper-right tab of the panel.

Format text as superscript or subscript

Superscript characters are reduced in size and shifted above the text baseline; subscript characters are reduced in size and shifted below the text baseline. If the font does not include superscript or subscript characters, After Effects generates faux superscript or subscript characters.

- Click the Superscript button or the Subscript button in the Character panel.
- Choose Superscript or Subscript from the Character panel menu.

Note:

You open the panel menu by clicking the panel menu button in the upper-right tab of the panel.

Chinese, Japanese, and Korean text

After Effects provides several options for working with Chinese, Japanese, and Korean (CJK) text. Characters in CJK fonts are often referred to as *double-byte characters* because they require more than one byte of information to express each character.

To display CJK font names in English, choose Show Font Names In English from the Character panel menu. You open the panel menu by clicking the panel menu button in the upper-right tab of the panel.

Adjust tsume

Tsume reduces the space around a character by a specified percentage value. The character itself is not stretched or squeezed as a result. When tsume is added to a character, spacing around both sides of the character is reduced by an equal percentage.

1. Select the characters you want to adjust.
2. In the Character panel, enter or select a percentage for Tsume . The greater the percentage, the tighter the compression between characters. At 100% (the maximum value), no space exists between the character's bounding box and its em box.

Specify how leading is measured

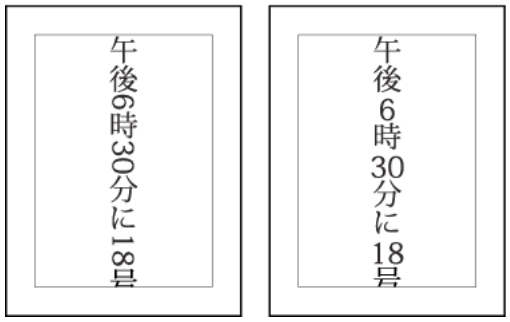
1. Select the paragraphs you want to adjust.
2. Choose Top-To-Top Leading or Bottom-To-Bottom Leading from the Paragraph panel menu. A check mark indicates which option is selected.

   Note:

   You open the panel menu by clicking the panel menu button in the upper-right tab of the panel.

Use tate-chuu-yoko

Tate-chuu-yoko (also called *kumimoji* and *renmoji*) is a block of horizontal text laid out within a vertical text line.



Original layer (left) and after tate-chuu-yoko is applied (right)

1. Select the characters that you want to rotate.
2. Choose Tate-Chuu-Yoko from the Character panel menu. (A check mark indicates that the option is turned on. To turn off the option, choose Tate-Chuu-Yoko again.)

   Note:

   You open the panel menu by clicking the panel menu button in the upper-right tab of the panel.

   Using tate-chuu-yoko does not prevent you from editing and formatting text; you can edit and apply formatting options to rotated characters as you do to other characters.

Smart quotes

Smart quotes, or *printer's quotation marks*, use a curved left or right quotation mark instead of straight quotation marks.

? To use smart quotes, choose Use Smart Quotes from the Character panel menu.

Note:

You open the panel menu by clicking the panel menu button in the upper-right tab of the panel.

Examples and resources for text animation

After Effects provides a vast array of capabilities for effective and creative 2D and 3D text animation. The resource and examples you'll find here provide detailed instructions on how to animate your text in After Effects.

Harry Frank provides a tutorial on animating text with text animators on the Digital Arts Online website.

Steve Holmes provides a tutorial on the Layers Magazine website that uses three text animators and per-character 3D text animation to create a text animation.

Colin Braley provides a tutorial and example project on his website that show how to use an expression on the Source Text property to animate text to overcome some of the limitations of the Numbers effect.

Eran Stern provides a video tutorial on the Creative COW website that demonstrates how to use per-character 3D text animation to animate text along a path in the shape of a 3D tornado.

Angie Taylor provides a tutorial on the Digital Arts website that shows how to use per-character 3D text animation together with a common workaround for simulating extruded 3D text.

Eran Stern provides a video tutorial on the Artbeats website that shows how to use the After Effects text animation system as a particle system.

Rich Young collects several resources and tutorials for creating extruded 3D text in After Effects.

On the ProVideo Coalition website, Chris & Trish Meyer provide several tips for animating text in After Effects.

Toby Pitman shows tricks for using shape layers to animate text on the MacProVideo website.

Example: Animate characters with per-character 3D properties

This example illustrates how you can easily animate individual characters in 3D so that each character steps out of line and takes a bow.

1. Create a new composition.
2. Create a new text layer with the word *ovation*.
3. Choose Animation > Animate Text > Enable Per-character 3D.
4. Choose Animation > Animate Text > Position.
5. Choose Animation > Animate Text > Rotation.
6. In the Timeline panel, in the Animator group, set the X Rotation property to 45, and set the Position value to (0.0, 0.0, -100.0).
7. Expand Range Selector 1.
8. Click the stopwatch icon for the Offset property to set an initial keyframe with the value at 0 seconds.
9. Set the Offset property value to -15%.
10. Set the End property value to 15%.
11. Move the current-time indicator to 10 seconds, and set the Offset value to 100%.
12. Press the R key to show the Rotation properties for the entire layer.
13. Set the Y Rotation value for the layer to -45, rotating the entire layer so that you can more easily see the 3D motion of the characters.
14. Preview the composition.

Example: Offset characters

This example illustrates how you can easily animate random characters so that they gradually form a legible word or phrase by specifying a Character Offset value and animating the range selector.

Animating the offset values for the characters in the word Galaxy

1. Create a new composition.
2. Create a new text layer with the word *Galaxy*.
3. Choose Animation > Animate Text > Character Offset.
4. In the Timeline panel, set the Character Offset value to 5.
5. Expand Range Selector 1.
6. Click the Start stopwatch to set an initial keyframe at 0 seconds and set the value to 0%.
7. Move the current-time indicator to 5 seconds and set the Start value to 100%.
8. Set Character Alignment to Center.
9. Preview the composition.

Example: Animate characters with the Wiggly selector

This example demonstrates how easy it is to animate the position of individual characters. It also shows how the Wiggly selector can create a dramatic change to the animation simply by adding it to the layer.

Animating the color and position of the characters in the word Galaxy

1. Create a new composition.
2. Create a new text layer with the word *Galaxy* and set the color to blue in the Character panel.
3. Choose Animation > Animate Text > Position.

4 In the Timeline panel, drag the y value of the Position property to the left until all of the characters are out of the frame.

5 Expand Range Selector 1.

6 Click the Start stopwatch and leave it at 0% at 0 seconds; then move the current-time indicator to 5 seconds and set Start to 100%.

7 Preview the composition.

8 Collapse the Animator 1 group.

9 Make sure that nothing is selected except the text layer name in the Timeline panel, and choose Fill Color > Hue from the Animate menu. A new animator group, Animator 2, appears in the Timeline panel.

10 Set Fill Hue to 1x+0.0.

11 Expand the Range Selector 1 for Animator 2.

12 Click the Start stopwatch and leave it at 0% at 0 seconds; then move the current-time indicator to 5 seconds and set Start to 100%.

13 Preview the animation. The colors change now as they drop from the top of the screen, but they all use the same color and end up the same, original color.

14 With Fill Hue selected, choose Selector > Wiggly from the Add menu.

15 Expand the Wiggly Selector 1 property and choose Add from the Mode menu.

16 Preview the composition.

Note:

If you add the Fill Hue property to Animator 1 and then add the Wiggly selector, both the position and the colors wiggle, instead of just the colors.

Example: Animate text tracking

This example shows you how easy it is to isolate characters when tracking a line of text. Using the Tracking and Line Anchor animator properties, you can easily move all but one or a few characters.

Animating the tracking values for the characters 3579 (left and center) so that only the 7 in the middle remains (right)

1 Create a new composition.

2 Create a new text layer and type *3579*.

3 With the text layer selected, click the Center Text button in the Paragraph panel.

4 Choose View > Show Grid.

5 In the Timeline panel, select the text layer and choose Animation > Animate Text > Tracking.

6 Make sure that Before & After is specified in the Track Type menu.

7 Click the Tracking Amount stopwatch and leave the value 0 at 0 seconds.

8 Move the current-time indicator to 5 seconds and drag the Tracking Amount value until all characters are off the screen.

9 Preview the animation.

10 With the current-time indicator at 0, take a snapshot of the Composition panel. You will use this snapshot, and the grids, to determine the original location of the number 7 at the end of the animation.

11 Move the current-time indicator to 5 seconds.

12 Click the Show Snapshot button.

13 In the Timeline panel, select Animator 1 and choose Line Anchor from the Add menu.

14 Drag the Line Anchor value until the *7* is positioned in approximately its original position in the center of the Composition panel.

15 Click the Show Snapshot button in the Composition panel to see the exact location of the *7* in its original location. Adjust the Line Anchor value to position the character in the original location.

16 Preview the animation.

Example: Use selectors to animate specific words

This example shows how to use selectors to limit an animation to a specific word.

Animating the skew values in the characters in the word Speeding

1 Create a new composition.

2 Create a new text layer with the words *Speeding Saucer*.

3 Choose Animation > Animate Text > Skew.

4 In the Timeline panel, set the Skew value to 35.

5 Expand Range Selector 1.

6 Make sure the current-time indicator is at 0 seconds and click the End stopwatch.

7 In the Composition panel, drag both selector bars to the left side of the *S* in *Speeding*.

8 Move the current-time indicator to 2 seconds and drag the right selector bar to the right side of the *g* in *Speeding*.

9 Preview the composition.

Example: Create a write-on animation

You can easily create the appearance of writing on the screen by using the Opacity animator property.

Writing text on using the Opacity property

1. Create a new composition.
2. Create a text layer with the characters *01234*.
3. Choose Animation > Animate Text > Opacity.
4. Set Opacity to 0%.
5. Expand the Range Selector 1 and click the stopwatch icon for Start.
6. In the Composition panel, drag the start selector to the left edge of the text (the value will be at 0).
7. Move the current-time indicator to 5 seconds and drag the start selector in the Composition panel to the right edge of the text (the value will be 5).
8. Preview the composition.

   Note:

   By default, the Smoothness property is set to 100%. To create a typewriter appearance, expand the Advanced property and set Smoothness to 0%.

Example: Animate text with multiple selectors

This example uses the *selectorValue* parameter in an Expression selector with the Wiggly selector to make a string of characters flash on and off randomly.

1. Create a new composition.
2. Create a new text layer.
3. In the Timeline panel, choose Opacity from the Animate menu for the text layer.
4. Expand the text layer and its animator in the Timeline panel.
5. Select the Range Selector and delete it.
6. Choose Add > Selector > Wiggly next to the Animator property group for the text layer.
7. Choose Add > Selector > Expression. If the Wiggly selector doesn't come before the Expression selector, drag the Wiggly selector above the Expression selector.
8. Expand the Expression Selector.
9. Expand the Amount property to reveal the expression. The following expression appears by default:

   ```
   selectorValue * textIndex/textTotal
   ```

10. Replace the default expression text with the following expression:

    ```
    r_val=selectorValue[0];
    if(r_val < 50)r_val=0;
    if(r_val > 50)r_val=100;
    r_val
    ```

11. Set the opacity to 0%, and preview the composition.

Example: Animate text position with expressions

This example uses the *textIndex* and *textTotal* attributes with the *wiggle* expression to animate a line of text.

1. Create a new composition.
2. Create a new text layer.
3. Expand the text layer in the Timeline panel to view the text properties. Add a Position animator group from the Animate menu.
4. Delete the default Range selector, Range Selector 1.
5. Add an Expression selector by selecting the Add menu, then choosing Selector > Expression. Expand the Expression selector to reveal its options.
6. Expand the Amount property to reveal the expression. The following expression appears by default:

   ```
   selectorValue * textIndex/textTotal
   ```

7. Replace the default expression with the following expression:

   ```
   seedRandom(textIndex);
   amount=linear(time, 0, 5, 200*textIndex/textTotal, 0);
   wiggle(1, amount);
   ```

   The *linear* method is used in this example to ramp down the maximum wiggle amount over time.
8. Set the vertical position value. The greater the value, the more the characters wiggle.
9. Preview your composition.

Example: Animate text as a timecode display

? With no layers selected in the Timeline panel, double-click the Current Time Format animation preset in the Effects & Presets panel. (You can locate the animation preset by typing its name in the Contains field in the Effects & Presets panel.)

A new text layer is created, with an expression on the Source Text property that makes the text show the current time in the time display format set for the project.

You can use other expressions in the Global category to display time in another format.

To see the expressions on a layer, select the layer and press EE.

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Create incredible motion graphics, text animation, and visual effects with Adobe After Effects. Design for film, TV, video, and web.

Animating text

About text animation

Animating text layers is useful for many purposes, including animated titles, lower thirds, credit rolls, and dynamic typography.

As with other layers in After Effects, you can animate entire text layers. However, text layers offer additional animation features with which you can animate the text within the layers. You can animate text layers by using any of the following methods:

- Animate the Transform properties, as you would any other layer, to change the entire layer, not its text contents.
- Apply text animation presets. (See Text animation presets.)
- Animate the source text of the layer, so that the characters themselves change to different characters or use different character or paragraph formats over time. (See Select and edit text in text layersand Writing expressions for source text.)
- Use text animators and selectors to animate many properties of individual characters or a range of characters. (See Animate text with text animators.)

To smooth the edges and movement of animated text, enable motion blur for the text layer. See Motion blur for more information.

Text animation presets

Browse and apply text animation presets as you would any other animation presets. You can browse and apply animation presets in After Effects using the Effects & Presets panel or Adobe Bridge. To open the Presets folder in Adobe Bridge, choose Browse Presets from the Effects & Presets panel menu or from the Animation menu. (See Apply an effect or animation preset and Animation presets.)

A great way to see how advanced users use After Effects is to apply an animation preset, and press U or UU to reveal only the animated or modified layer properties. Viewing the animated and modified properties shows you what changes the designer of the animation preset made to create the animation preset.

Tips, notes, and caveats for text animation presets

The text animation presets were created in an NTSC DV 720x480 composition, and each text layer uses 72-point Myriad Pro. Some preset animations move the text on, off, or through the composition. The animation preset position values may not be appropriate for a composition that is much larger or smaller than 720x480; for example, an animation that is supposed to start outside the frame may start inside the frame. If the text isn't positioned as expected or the text disappears unexpectedly, adjust the position values for the text animator in the Timeline panel or Composition panel.

After you apply a 3D Text animation preset, you may need to rotate the layer or add a camera to rotate around the layer to see the results of the 3D animation.

Text animation presets in the Paths category automatically replace the source text with the name of the animation preset and change the font color to white. These animation presets may also change other character properties.

The Fill And Stroke category of animation presets contains presets that may change the fill color and stroke properties of the preset that you apply. If the animation preset requires a stroke or fill color, the animation works only if you have assigned one to your text.

Additional online resources for animation presets

For a list of animation presets included with After Effects, see Animation preset list.

Animate text with text animators

Animating text with animators and selectors consists of three basic steps:

- Add an animator to specify which properties to animate.
- Use a selector to specify how much each character is affected by the animator.
- Adjust the animator properties.

Note:

To always affect all characters in the layer, delete the default selector. In this case, animating a text layer is not much different from animating any other layer.

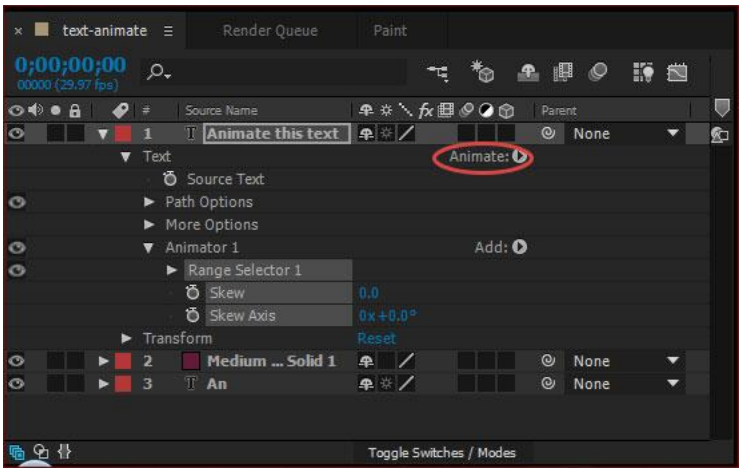
Usually, you don't need to set keyframes or expressions for the animator properties. It's common to only set keyframes or expressions for the selector and specify only the ending values for the animator properties.

1. Select a text layer in the Timeline panel, or select the specific characters that you want to animate in the Composition panel.
2. Do one of the following:
   - Choose Animation > Animate Text and then choose a property from the menu.

   Note:

   The Enable Per-Character 3D menu item does not add an animator. It adds 3D properties to the layer and to the individual characters, for which you can then add animators.

   - Choose a property from the Animate menu, located in the Switches/Mode column of the Timeline panel.



Animate menu

3. In the Timeline panel, adjust the animator property values. Often, you simply set the property that you want to animate to its ending value and then use the selectors to control everything else.

4 Expand the Range Selector property group and set keyframes for Start or End properties by clicking the stopwatch for the property and doing one of the following:

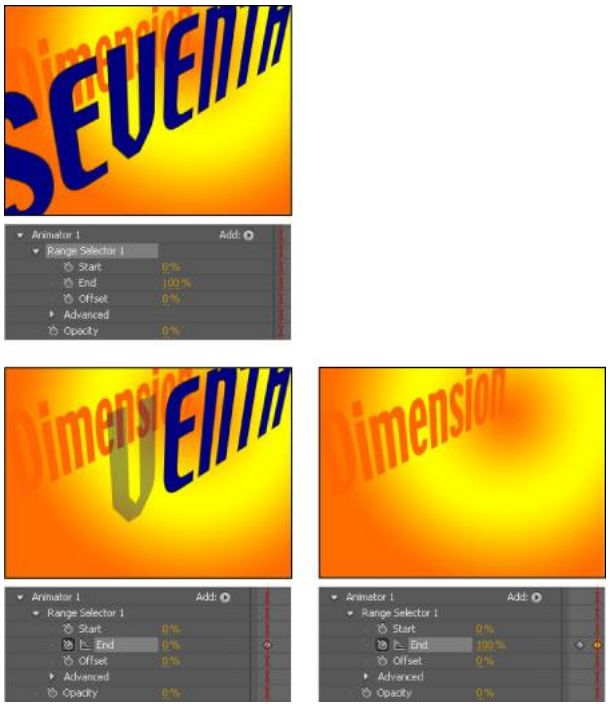
- Set the values for Start and End in the Timeline panel.

You may find it easier to think in terms of numbers of characters than percentages for the Start and End properties of a range selector. To show these properties in numbers of characters (including spaces), choose Index for Units in the Advanced property group of a range selector.

- Drag the selector bars in the Composition panel. The pointer changes to the selector movement pointer when it is over the middle of a selector bar.

5 To refine the selection, expand Advanced and specify options and values as desired.

For example, to animate opacity gradually from the first character to the last, you can add an animator for Opacity, set the Opacity value (in the Animator property group) to 0, and then set keyframes for the End property of the default selector to 0% at 0 seconds and 100% at a later time.



Animating the opacity of a text layer using the Opacity animator and the End property

You can create elaborate animations using several animators and several selectors, each of which adds its influence to the text animation.

Text animator properties

Animator properties work much like other layer properties, except that their values only influence the characters that are selected by the selectors for the animator group. Choose Enable Per-Character 3D to add 3D properties to a text layer; this command does not add properties to an animator group.

- To add an animator group to a text layer, select the text layer in the Timeline panel, and choose a property from the Animation > Animate Text menu or from the Animate menu for the layer in the Switches/Modes column in the Timeline panel. A new animator group, along with a default selector and the chosen animator property, appears in the Timeline panel.
- To add a new animator property to an existing animator group, select the animator group in the Timeline panel, and choose the property from Animation > Animate Text menu or from the Add menu for the animator group in the Timeline panel. The new animator property appears within the same group as the existing animator property and shares the existing selectors.
- To delete an animator property or animator group, select it in the Timeline panel and press Delete.
- To remove animators from a text layer, select the text layer in the Timeline panel, and choose Animation > Remove All Text Animators.
- To copy an animator group, select it in the Timeline panel and choose Edit > Copy. To paste the animator group, select a layer and choose Edit > Paste.
- To rename an animator group, make sure that it is the only thing selected, and then press Enter (Windows) or Return (Mac OS); or right-click (Windows) or Control-click (Mac OS) the name and choose Rename.
- To reorder an animator group, drag it to a new location in the stacking order in the Timeline panel.

Animator properties

Anchor Point Anchor point for the characters: the point about which transformations—such as scaling and rotation—are performed. (See Text anchor point properties.)

Position The position of the characters. You can specify values for this property in the Timeline panel, or you can modify it by selecting it in the Timeline panel and then dragging the layer in the Composition panel using the Selection tool, which changes to a move tool when positioned over text characters. Dragging with the move tool does not affect the z (depth) component of Position.

Scale The scale of the characters. Because scale is relative to the anchor point, changes to the z component of Scale have no apparent result unless the text also has an Anchor Point animator with a nonzero z value.

Skew The slant of the characters. The Skew Axis specifies the axis along which the character is skewed.

Rotation, X Rotation, Y Rotation, Z Rotation If per-character 3D properties are enabled, you can set the rotation about each axis individually. Otherwise, only Rotation (which is the same as Z Rotation) is available.

All Transform Properties All of the Transform properties are added at once to the animator group.

Line Anchor The alignment for the tracking in each line of text. A value of 0% specifies left alignment, 50% specifies center alignment, and 100% specifies right alignment.

Line Spacing The space between lines of text in a multiline text layer.

Character Offset The number of Unicode values to offset selected characters. For example, a value of 5 advances the characters in the word five steps alphabetically, so the word *offset* becomes *tkkxjy*.

Character Value The new Unicode value for selected characters, replacing each character with one character represented by the new value. For example, a value of 65 replaces all of the characters in a word with the 65th Unicode character (*A*), so the word *value* becomes *AAAAA*.

Character Range Specifies limits on the character. This property appears whenever you add the Character Offset or Character Value property to a layer. Choose Preserve Case & Digits to keep characters in their respective groups. Groups include uppercase Roman, lowercase Roman, digits, symbols, Japanese katakana, and so forth. Choose Full Unicode to allow for unlimited character changes.

Blur The amount of Gaussian blur to be added to the characters. Horizontal and vertical blur amounts can be specified separately.

Text selectors

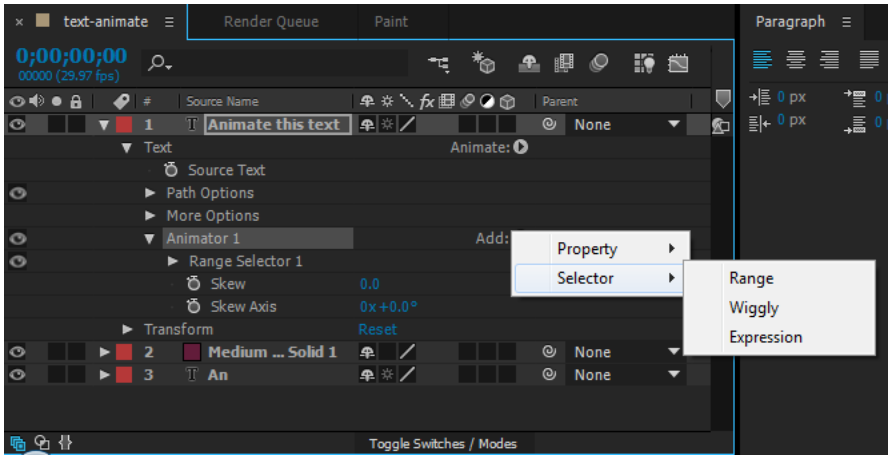
Each animator group includes a default range selector. You can replace the default selector, add additional selectors to an animator group, and remove selectors from a group.

Selectors are a lot like masks: You use selectors to specify which part of a range of text you want to affect, and by how much. You can use multiple selectors and specify a Mode setting for each one to determine how it interacts with the text and with other selectors in the same animator group. If you have only one selector, Mode specifies the interaction between the selector and the text—Add is the default behavior; and Subtract inverts the influence of the selector.

If you delete all selectors from an animator group, the values of the animator properties apply to all characters in the layer. This technique is useful because properties of the text specified by the Character panel cannot otherwise be animated (except by using Hold keyframes on the Source Text property itself).

Use a Wiggly selector to vary a selection within a specified amount over time. Use expression selectors to use expressions to dynamically specify how much you want characters to be affected by an animator property.

- To add a selector using the Timeline panel, select an animator group in the Timeline panel and choose Selector from the Add menu for the animator group, or choose Animation > Add Text Selector. Choose Range, Wiggly, or Expression from the submenu.
- To add a selector using the Composition panel, select a range of characters in the Composition panel, right-click (Windows) or Control-click (Mac OS) the text, and choose Add Text Selector from the context menu. Choose Range, Wiggly, or Expression from the submenu.
- To delete a selector, select it in the Timeline panel and press Delete.
- To rename a selector, make sure that it is the only thing selected, and then press Enter (Windows) or Return (Mac OS); or right-click (Windows) or Control-click (Mac OS) the name and choose Rename.
- To copy a selector, select it in the Timeline panel and choose Edit > Copy. To paste the selector, select a layer and choose Edit > Paste.
- To reorder a selector, drag it to a new location in the stacking order in the Timeline panel.



Adding a new range selector to an animator group

Common selector properties

Mode Specifies how each selector combines with the text and with selector above it, similar to how multiple masks combine when you apply a mask mode. For example, if you want to wiggle only a specific word, use a range selector on that word and then add a Wiggly selector and set it to Intersect mode.

Amount Specifies how much the range of characters is affected by animator properties. At 0%, the animator properties do not affect the characters. At 50%, half of each property value affects the characters. This option is useful for animating the result of animator properties over time. Using an expression selector, you can use expressions to dynamically set this option.

Units and Based On The units for Start, End, and Offset. You can use either the percentage or index units and base the selection on the characters, characters excluding spaces, words, or lines. If you select Characters, After Effects counts spaces and effectively pauses the animation between words as it animates the spaces between words.

Original (left) and with VEN selected by the range selectors, Based On set to Character, Shape set to Triangle, and Scale set to 40% (right)

Range selector properties

Range selectors include the following properties, in addition to properties common with other selectors:

Start and End The beginning and end of the selection. You can modify the Start and End properties by dragging the selector bars in the Composition panel when the selector is selected in the Timeline panel.

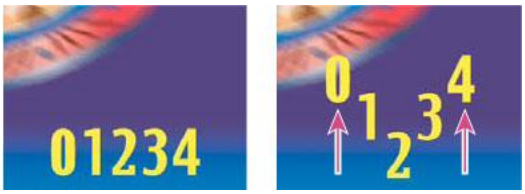
Offset The amount to offset the selection from the selection specified by the Start and End properties. To set Offset in the Composition panel while you edit the Start or End values, Shift-click the Start or End selector bars with the Selection tool.

Shape Controls how characters are selected between the Start and End of the range. Each option modifies the selection by creating transitions between selected characters using the chosen shape. For example, when animating the y Position

values of text characters using Ramp Down, the characters gradually move at an angle from the lower left to the upper right. You can specify Square, Ramp Up, Ramp Down, Triangle, Round, and Smooth.

Using different Shape options, you can greatly change the appearance of an animation.

Original (left) and after selecting the entire word, setting Based On to Characters, animating the y Position value so that the word is at the bottom of the frame, and setting Shape to Ramp Down (right)



Setting Shape to Triangle

Smoothness Determines the amount of time the animation takes to transition from one character to another when you use the Square shape.

Ease High and Ease Low Determines the speed of change as selection values change from fully included (high) to fully excluded (low). For example, when Ease High is 100%, the character changes more gradually (eases into the change) while it is fully to partially selected. When Ease High is -100%, the character changes quickly while it is fully to partially selected. When Ease Low is 100%, the character changes more gradually (eases into the change) while it is partially selected to unselected. When Ease Low is -100%, the character changes quickly while it is partially selected to unselected.

Randomize Order Randomizes the order in which the property is applied to the characters specified by the Range selector. (By contrast, when you use the Wiggly selector, the value of the animator property is randomized.)

Random Seed Calculates the randomized order of a range selector when the Randomize Order option is set to On. When Random Seed is zero, the seed is based on its animator group. If you want to duplicate an animator group and retain the same randomized order as in the original animator group, set Random Seed to a value other than zero.

Wiggly selector properties

The Wiggly selector includes the following properties, in addition to properties common with other selectors:

Max Amount and Min Amount Specifies the amount of variation from the selection.

Wiggles/Second How many variations from the set selection occur per second.

Correlation Correlation between variations for each character. At 100%, all characters wiggle by the same amount at the same time, and at 0%, all characters wiggle independently.

Temporal and Spatial Phase (revolutions + degrees) The variation of wiggle, based on the phase of your animation in time (temporal) or per character (spatial).

Lock Dimensions Scales each of the dimensions of the wiggled selection by the same value. This option is useful when wiggling the Scale property.

Random Seed See Randomness and random seeds.

Jonathan Fowler provides a video tutorial on his website that shows how to use the Wiggly Selector to randomly animate (offset) characters to create a fluctuating string of binary digits (1s and 0s).

Expression selector properties

Expand the Expression Selector property group and the Amount property group to reveal the expression field in the Timeline panel. By default, the Amount property begins with the expression *selectorValue * textIndex/textTotal*.

Expression selectors allow you to express the selector values for each character. The expression is evaluated once per character. Each time it is evaluated, the input parameter *textIndex* is updated to match the index of the character.

Apply the Text Bounce or Inch Worm animation preset to a text layer to see how expression selectors can be used. To see all expressions on a layer, select the layer and press EE.

In addition to the expression elements you use elsewhere, you can use the following attributes to animate selections in any number of interesting ways:

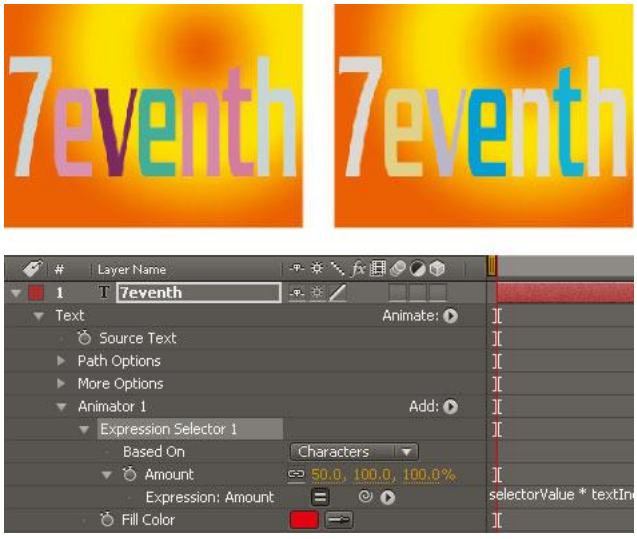
textIndex Returns the index of the character, word, or line.

textTotal Returns the total number of characters, words, or lines.

selectorValue Returns the value of the previous selector. Think of this value as the input from the selector above the expression selector in the stacking order.

Note:

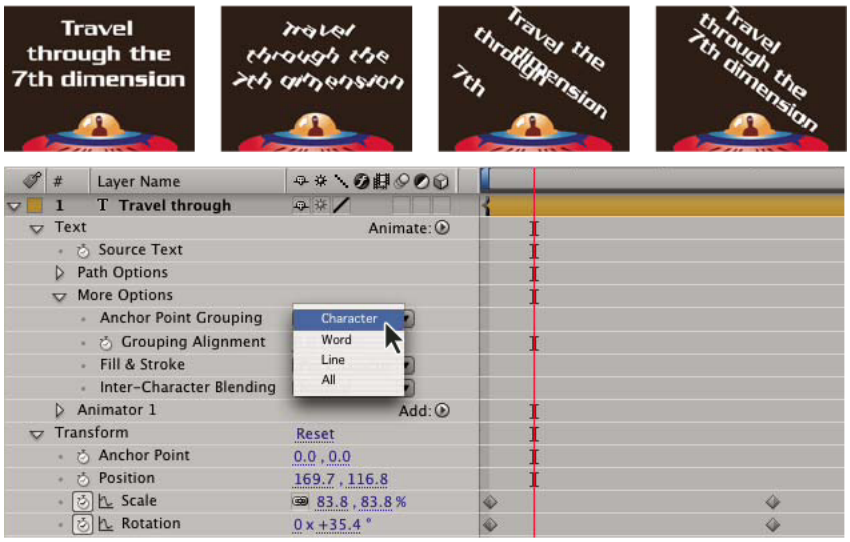
The attributes textIndex, textTotal, and selectorValue can be used only with the expression selector. Using them elsewhere results in a syntax error.



Fill color changes randomly using an expression animator.

Text anchor point properties

Text animators animate character position, rotation, and size-related properties relative to an anchor point. You can use the text property, Anchor Point Grouping, to specify whether the anchor point used for transformations is that of each character, each word, each line, or the entire text block. In addition, you can control the alignment of the anchor points of the characters relative to the anchor point of the group with the Grouping Alignment property.



Original text, then rotated and with Grouping Alignment set to Character, Word, and Line

1 Expand the text layer in the Timeline panel, and expand the More Options property group.

2 Do any of the following:

- Choose how to group the character anchor points from the Anchor Point Grouping menu.
- Lower the Grouping Alignment values to move each anchor point up and to the left.
- Raise the Grouping Alignment values to move each anchor point down and to the right.

To center the anchor point in a string of capital letters, try a Grouping Alignment value of 0%, -50%. To center the anchor point in a string of lowercase letters, or if you're using both lowercase and uppercase letters, try 0%, -25%.

When you select certain properties in the Timeline panel for a text animation, anchors points are shown in the Composition panel. These properties include Anchor Point Grouping, Grouping Alignment and the animator properties Anchor Point, Position, Scale, Rotation (including per-character 3D versions: X Rotation, Y Rotation, Z Rotation).

Per-character 3D text properties

You can move, scale, and rotate individual characters in three dimensions using 3D animator properties. These properties become available when you enable per-character 3D properties for the layer. Position, Anchor Point, and Scale gain a third dimension; and two additional Rotation properties (X Rotation and Y Rotation) become available. The single Rotation property for 2D layers is renamed to Z Rotation.

3D text layers have an auto-orientation option, Orient Each Character Independently, which orients each character around its individual anchor point to face the active camera. Selecting Orient Each Character Independently enables per-character 3D properties for the text layer if they aren't already enabled. (See Auto-Orientation options.)

Enabling per-character 3D properties causes each character in the text layer to behave like an individual 3D layer within the text layer, which behaves like a precomposition with collapsed transformations. Per-character 3D layers intersect with other 3D layers following the standard rules for 3D precompositions with collapsed transformations. (See 3D layer interactions, render order, and collapsed transformations.)

A text layer itself automatically becomes a 3D layer when you enable 3D properties for its characters. Therefore, a text layer becomes a 3D layer when a per-character 3D property is added to the layer—whether by copying and pasting the Y Rotation property from another layer or applying a 3D Text animation preset.

A per-character 3D layer is designated by a special icon in the Switches column.

Inter-character blending and the Fill & Stroke options in the More Options property group are not available for per-character 3D layers.

Per-character 3D layers can decrease rendering performance. When you convert a layer from per-character 3D to 2D, the animator properties and dimensions specific to per-character 3D layers are lost. Re-enabling per-character 3D will not restore values for these properties.

- To enable per-character 3D animator properties for a text layer, select the layer and choose Enable Per-character 3D from the Animation > Animate Text menu or from the Animate menu for the layer in the Timeline panel.
- To disable per-character 3D animator properties for a text layer and convert the layer to a 2D layer, click the Per-character 3D switch for the layer in Switches column in the Timeline panel.
- To disable per-character 3D animator properties for a text layer but keep it as a 3D layer, choose Enable Per-character 3D to deselect it.

Online resources for per-character 3D text animation

Trish and Chris Meyer introduce per-character 3D text animation in n a video on the ProVideo Coalition website.

Eran Stern provides a video tutorial on the Creative COW website that demonstrates how to use per-character 3D text animation to animate text along a path in the shape of a 3D tornado.

Angie Taylor provides a tutorial on the Digital Arts website that shows how to use per-character 3D text animation together with a common workaround for simulating extruded 3D text.

Creating and animating text on a path

When you have a mask on a text layer, you can make the text follow the mask as a path. You can then animate the text along that path, or animate the path itself. You can use open or closed masks to create paths for text. After you create the path, you can modify it at any time. When using a closed mask as a text path, make sure to set the mask mode to None.

To disable the Path Options property group for a text layer, click the visibility (eyeball) switch for the Path Options property group. Temporarily disabling the Path Options property group can make editing and formatting text easier.

Position text along a mask path

1 Create a text layer and enter text.

2 With the text layer selected, use the Pen tool or a mask tool to draw a mask in the Composition panel.

3 In the Timeline panel, expand the Path Options property group for the text layer and select the mask from the Path menu. The text automatically uses the alignment specified in the Paragraph panel.

4 To reposition the text on the path, change the text margins using the First Margin and Last Margin properties in the Timeline panel, or do one of the following in the Composition panel:

- Drag the left margin control , center margin control , or right margin control to move text along the path.
- Shift-drag any margin control to snap the control to the mask vertices.

Note:

Select a property in the Text property group in the Timeline panel to see the margin controls in the Composition panel. The text alignment determines which controls are available.

Changing the Last Margin of path text in the Composition panel

Text path properties

Use the Path Options properties to specify a path and alter the way that individual characters appear on the path—perpendicular to the path, aligned to the left or right, reversed, and so on. Animating Path Options properties is an easy way to animate text along a path.

Reverse Path Reverses the direction of the path.

Perpendicular To Path Rotates each character so that it is perpendicular to the path.

Force Alignment Positions the first character at the beginning of the path (or at the specified First Margin location), positions the last character at the end of the path (or at the specified Last Margin location), and evenly spaces the remaining characters between the first and last characters.

First Margin Specifies the position of the first character in pixels, relative to the start of the path. First Margin is ignored when text is right-aligned and Force Alignment is Off.

Last Margin Specifies the position of the last character in pixels, relative to the end of the path. Last Margin is ignored when text is left-aligned and Force Alignment is Off.

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Extruding text and shape layers

About beveled and extruded text and shape layers

In computer graphics, an extruded object is one that appears to be three-dimensional. This 3D appearance is most apparent when moving the object, or moving a camera around the object. Bevel is the control over the edges for an extruded object.

You can create beveled and extruded text and shape layers by working in a Ray-traced 3D composition. For more information, see The Ray-traced 3D renderer

In order to work with beveled and extruded text and shape layers, work in a Ray-traced 3D composition. See Creating a Ray-traced 3D composition.

Ray-traced 3D compositions are rendered on either qualified NVIDIA GPUs or all CPU cores installed in your computer. If you do not have a qualified GPU, CPU rendering occurs automatically. GPU rendering is preferable since the performance is much faster.See this page on the Adobe website for a list of GPUs for which the GPU acceleration of the ray-traced 3D renderer is supported.

Depending on your hardware and complexity of your composition, objects within Ray-traced 3D compositions can be difficult to manipulate. If you are having a difficult time manipulating objects in the Ray-traced 3D composition, you can use Fast Previews. Fast Previews mode is ideal to use for roughing in, and experimenting with extruded text and shape layer animations. For details, see Fast Previews.

If your computer supports Ray-traced 3D rendering on the GPU and CPU, you can force rendering to occur on the CPU (for example, if you are using a headless environment.). For more information, see Setting preferences for OpenGL, and the GPU.

Video tutorial: Ray-traced, extruded text and shapes - part 1

Video tutorial: Ray-traced, extruded text and shapes - part 1

The Ray-traced 3D renderer

The Ray-traced renderer is also available as a composition renderer. It is separate from the existing Advanced 3D (now called Classic 3D) composition renderer that has been the default renderer in previous versions. The Ray-traced 3D renderer is a radical departure from the existing scanline renderer. It can handle reflections, transparency, index of refraction, environment maps, in addition to the existing material options.

Existing capabilities like soft shadows, motion blur, depth-of-field blur, intra-character shadowing, projection of an image onto a surface with any light type, and intersection of layers are supported. 2D layer backdrops at the bottom of the stacking order are visible, and you can look through translucent objects to see them.

Limitations of the Ray-traced 3D renderer

Ray-traced 3D renderer does not render the following features:

- Blending modes
- Track mattes
- Layer styles
- Masks and effects on continuously rasterized layers, including text and shape layers
- Masks and effects on 3D precomposition layers with collapsed transformations

- Preserve Underlying Transparency

Additional features of a Ray-traced 3D composition

Features of a Ray-traced 3D composition also include:

- Bending a footage layer
- Additional material options (reflection, index of refraction, transparency)
- Environment layer

Creating a Ray-traced 3D composition

It is necessary to work in a Ray-traced 3D composition for extruded text and shapes, bendable layers, and associated features. You can create a Ray-traced 3D composition, or turn an existing composition into a Ray-traced 3D composition. To create a Ray-traced 3D composition, do the following:

1. Create a composition.
2. Open the Composition Settings dialog box for the composition.
3. Click the Advanced tab, then set the Rendering Plug-in (now called Renderer) to Ray-traced 3D.

To turn an existing composition into a Ray-traced 3D composition, omit the first step.

Your composition is now a Ray-traced 3D composition that allows for extruded text and shapes.

For more information about the Advanced composition settings, ray-tracing quality, and anti-alias filtering, see 3D renderer settings.

Note:

In a Ray-traced 3D composition, camera layers no longer have Iris Diffraction Fringe, Highlight Gain, Highlight Threshold, and Highlight Saturation properties.

Previewing Ray-traced 3D compositions

When previewing 3D Ray-traced compositions, you can choose a different Fast Previews mode to achieve a more suitable workflow. See Fast Previews.

Monitoring and changing the composition renderer

To know which composition renderer (Classic 3D or Ray-traced 3D) is currently being used, check the Renderer button on the upper-right corner of the Composition panel.

This button appears only when there are 3D layers, including cameras and lights, in the composition.

To change the composition renderer: Click the button to open the Advanced tab of the Composition Settings dialog box.

To modify the current renderer's options: Ctrl-click (Windows) or Cmd-click (Mac) the button.

Creating beveled and extruded text and shape layers

In the Ray-traced renderer, 3D text and shape layers can have an extrusion or bevel. For a beveled and extruded text or shape layer, do the following:

1. Create a Ray-traced 3D composition

2 Create a text or shape layer.

3 Enable 3D for the layer.

For more information on enabling 3D for a layer, see Convert 3D layers.

4 Adjust controls for bevel and extrusion

To control their appearance, use these properties in the layer's Geometry Options section in the Timeline panel:

- **Bevel Style**: The form of the bevel. Options are None (default), Angular, Concave, and Convex.
- **Bevel Depth**: The size in pixels (horizontally and vertically) of the bevel.
- **Hole Bevel Depth**: The size of bevel for inner parts of a text character, such as the hole in an "O". It's expressed as a percentage of the Bevel Depth.
- **Extrusion Depth**: The pixel thickness of the extrusion. The side (extruded) surface is perpendicular to the front surface.

These 3D objects are based on the geometry of swept surfaces (where a 2D shape can move along a specified path), which is a departure from the pixel-based text and shapes in the Classic 3D renderer. As such, masking, effects, and track mattes do not make sense when applied to geometry. The geometrical properties of text and shapes are preserved, so character styles like kerning, font size, and subscript are supported.

The following issues are known:

- Fill or stroke gradients are not supported on 3D shape layers.
- Even-odd winding in shapes does not currently work properly. You might need to use a Merge Paths operator instead.
- Shapes with self-intersecting paths might not be filled correctly. Also, objects with compound paths containing multiple nested holes might not render correctly.

Ray-traced 3D, extruded text, and shapes

Ray-traced 3D, extruded text, and shapes

Beveled and extruded vector artwork

You can create a shape layer from a vector art footage layer, and then modify the shape layer. Once a vector layer has been converted into a shape layer, you can bevel and extrude it.

For more information about creating shape layers from vector artwork, see Convert Vector Art Footage to Shape.

Bending a footage layer

In the Ray-traced renderer, your 3D layer and nested composition layers have the following geometry options for curving them around a vertical axis:

- **Curvature**: The amount of bend (as a percentage). It defaults to 0% (no bend), but can go between -100% and 100% to simulate video walls or the flapping of wings.
- **Segments**: The smoothness of or number of facets in the bend, with a lower number producing a coarser look with wider facets.

Masks and effects can be applied, but these types of layers cannot be beveled or extruded. Also, masks and effects are ignored on collapsed 3D composition layers.

Material options

Materials are used for the surfaces of 3D objects, and material options are the properties for the surfaces that dictate how the objects interact with light. After Effects has several material options properties, and ways to apply materials to extruded text and shape layers.

The Material Options section for a layer in the Timeline panel contains the following properties:

- **Appears in Reflections**: Indicates if the layer appears in other reflective layers' reflections.
  - The On and Off options control if the reflection appears, but the layer itself is visible.
  - The Only option is like the On option that it is reflected but the layer itself is invisible.
- **Reflection Intensity**: Controls how much of other reflective 3D objects and the environment map appear on this object.
  - Reflections get slightly brighter and the material becomes more mirror-like based on the viewing angle, based on the Reflection Rolloff property value. Reflections when viewing a surface at a glancing angle are brighter than when viewing directly at the surface. Reflections are also more energy conserving in that diffusion is automatically decreased per pixel as the glancing angle decreases (that is, closer to viewing across the surface than straight on it).
  - In addition, you can control the glossiness of the reflection (from blurry to nearly mirror-like) by adjusting the Specular Shininess property.
- **Reflection Sharpness**: Controls the sharpness or blurriness of reflections.
  - Higher values produce sharper reflections whereas lower values make them blurrier.
  - Increase the Ray-tracing Quality to at least 3 if you cannot see the result of this setting.
- **Reflection Rolloff**: For a reflective surface, controls the amount of Fresnel effect (that is, the intensity of reflections at glancing angles).
- **Transparency**: Controls the material's transparency, and is separate from the layer's Opacity setting (but Opacity does factor into the object's transparency).
  - You can have a fully transparent surface but still get reflections and specular highlights to appear.
  - If the layer opacity is lowered, it would reduce the overall appearance. Also, the layer's alpha is honored, so if alpha is 0 the ray misses it completely.
- **Transparency Rolloff**: For a transparent surface, controls the amount of transparency relative to the viewing angle. Transparency is the specified value when viewing directly at a surface and more opaque when viewing at a glancing angle (for example, along the edges of a curved object if looking directly at it).
- **Index of Refraction**: Controls how light bends through 3D layers, and hence how objects behind a semitransparent layer appear.
- These properties are applied to all surfaces of a 3D text or 3D shape layer, but you can override them with text animators or shape operators.

The materials Intensity, and Shininess have been updated, and renamed to be Specular Intensity, and Specular Shininess, respectively. For information about existing material options, see Material Options properties.

Note: the Ray-traced 3D renderer uses an energy-conserving shader that adjusts direct lighting components (diffuse and ambient) and transparency based on reflection intensity and transparency, and specular intensity based on reflection rolloff. Specifically:

- Reflection Intensity is calculated with rolloff (Reflection Rolloff)
- Transparency is calculated with rolloff (Transparency Rolloff)

- Specular Intensity is calculated with rolloff (Reflection Rolloff)
- Diffuse and Ambient are reduced by (100% - Reflection Intensity) * (100% - Transparency)
- Transparency is then reduced by (100% - Reflection Intensity)

For example:

- If Reflection Intensity is 50% and Transparency 100%, Diffuse and Ambient becomes 0% (value% * (100-50)*(100-100)/100). Specular Intensity is reduced by the Reflection Rolloff amount. Transparency drops to 50% (100% * (100-50)/100).
- If Reflection Intensity is 50% and Transparency 50%, Diffuse and Ambient becomes 25% of their existing values, and Specular Intensity is reduced by the Reflection Rolloff amount. Transparency will drop to 25%.
- If Reflection Intensity is 100%, Diffuse, Ambient, and Transparency becomes 0%. Specular Intensity is reduced by the Reflection Rolloff amount.

Note: Color is not included in the material definition. A text or shape layer gets its color from the Character panel (for text) or shape operators (for shapes). However, you can override material properties by using the existing text animator and shape operator support. For 3D text layers, the Fill Color, Stroke Color, and Stroke Width options in the Animate pop-up menu get replaced with Front, Back, Bevel, and Side submenus of material options.

For 3D shape layers, the Gradient Fill and Gradient Stroke shape operators get replaced with Front, Back, Bevel, and Side submenus of material options. However, because the fill or stroke defines the geometry for a shape layer, the Fill and Stroke shape operators are still available in case you want to add them.

Note: Fill and stroke gradients for shape layers are ignored at this time.

Environment layer

In the Ray-traced renderer, you can use a 3D footage, or nested composition layer, as a spherically mapped environment around the scene. This environment map layer is seen on reflective objects.

To set a footage or nested composition layer as an environment layer: Choose **Layer** > **Environment Layer.** The layer turns into a 3D layer, a small "globe" icon appears next to its name, and the following reduced set of properties (under "Options") appears in the Timeline panel:

- **Orientation and X/Y/Z Rotation**: Rotates the backdrop environment and how it appears in reflections, which can be helpful to hide the seam between edges of the layer.
- **Opacity**: Controls the opacity of the environment as a backdrop, but not in reflections.
- **Appears in Reflections**: Controls how the environment map is used in the scene. You can have the environment appear in reflective objects in addition to seeing it as a backdrop (On), appear only in reflective objects and not as a backdrop (Only), or only as a backdrop and not in reflections (Off).

Although you can set any footage or nested composition layer as an environment layer, like cameras, the topmost visible (non-muted) environment layer at the current time is used. Also, environment layers, being used in reflections, won't appear in Fast Draft mode. Any semi-transparent regions in the environment layer shows the composition's background color in the backdrop, but not in reflections.

Similar to adjustment lights, you can enable the Adjustment Layer switch for an environment layer so it appears only in 3D reflective layers below it in the layer stacking order.

Note:

If you parent an environment layer to a layer with negative scale, the orientation is flipped (as expected).

Formatting paragraphs and the Paragraph panel

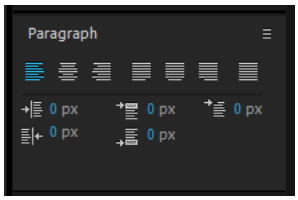
A paragraph is any range of text with a carriage return at the end. Use the Paragraph panel to set options that apply to entire paragraphs, such as the alignment, indentation, and leading (line spacing). For point text, each line is a separate paragraph. For paragraph text, each paragraph can have multiple lines, depending on the dimensions of the bounding box.

If the insertion point is in a paragraph or text is selected, changes you make in the Paragraph panel affect only paragraphs that are at least partially selected. If no text is selected, changes you make in the Paragraph panel affect the selected text layers and the text layer's selected Source Text keyframes, if any exist. If no text is selected and no text layers are selected, the changes you make in the Paragraph panel become the new defaults for the next text entry.

- To display the Paragraph panel, choose Window > Paragraph; or, with a type tool selected, click the panel button in the Tools panel.

To open the Character and Paragraph panels automatically when a type tool is active, select Auto-Open Panels in the Tools panel.

- To reset values in the Paragraph panel to the default values, choose Reset Paragraph from the Paragraph panel menu.



Paragraph alignment options

Note:

You open the panel menu by clicking the panel menu button in the upper-right tab of the panel.

Align and justify text

You can *align* text to one edge of a paragraph (left, center, or right for horizontal text; top, center, or bottom for vertical text) and *justify* text to both edges of a paragraph. Alignment options are available for both point text and paragraph text; justification options are available only for paragraph text.

Indent and space paragraphs

Indentation specifies the amount of space between text and the bounding box or line that contains the text. Indentation affects only the selected paragraph or paragraphs, so you can easily set different indentations for paragraphs.

- To indent paragraphs, enter a value in the Paragraph panel for an indentation option:

  Indent Left Margin: Indents text from the left edge of the paragraph. For vertical text, this option controls the indentation from the top of the paragraph.

Indent Right Margin: Indents text from the right edge of the paragraph. For vertical text, this option controls the indentation from the bottom of the paragraph.

Indent First Line: Indents the first line of text in the paragraph. For horizontal text, the first line indent is relative to the left indent; for vertical text, the first line indent is relative to the top indent. To create a first line hanging indentation, enter a negative value.

- To change space above or below paragraphs, enter a value in the Paragraph panel for Space Before and Space After .

Hanging punctuation for Roman fonts

Hanging punctuation controls whether punctuation marks fall inside or outside the margins. If hanging punctuation is turned on for Roman fonts, then periods, commas, single quotation marks, double quotation marks, apostrophes, hyphens, em dashes, en dashes, colons, and semicolons appear outside the margins.

? To enable or disable hanging punctuation for Roman fonts, choose Roman Hanging Punctuation from the Paragraph panel menu.

Note:

You open the panel menu by clicking the panel menu button in the upper-right tab of the panel.

Note:

When you use Roman Hanging Punctuation, any double-byte punctuation marks available in Chinese, Japanese, and Korean fonts in the selected range do not appear outside the margins.

Text composition methods

The appearance of text on the page depends on a complex interaction of processes called *text composition*. Using the word spacing, letter spacing, and glyph spacing options you've selected, After Effects evaluates possible line breaks and chooses the one that best supports the specified parameters.

After Effects offers two composition methods, which you choose from the Paragraph panel menu.

Note:

You open the panel menu by clicking the panel menu button in the upper-right tab of the panel.

Adobe Single-line Composer Offers a traditional approach to composing text one line at a time. This option is useful if you prefer to have manual control over how lines break. If spacing must be adjusted, the Single-line Composer first tries to compress, rather than expand text.

Adobe Every-line Composer Considers a network of breakpoints for a range of lines and thus can optimize earlier lines in the paragraph to eliminate especially unattractive breaks later on. Working with multiple lines of text results in more even spacing and fewer hyphens. The Every-line Composer approaches composition by identifying possible breakpoints, evaluating them, and assigning a weighted penalty based on these principles:

- Highest importance is given to evenness of letter and word spacing. Possible breakpoints are evaluated and penalized according to how much they deviate from optimal spacing.
- After breakpoint penalty values are identified for a range of lines, they are squared, magnifying the bad breakpoints. The composer then uses the good breakpoints.

Live Text Templates

About Live Text Templates

You can create text template compositions in After Effects wherein the source text can be edited in Premiere Pro. Any composition with text layers can be used as a text template, and unlocked text layers in that composition can be edited in Premiere Pro.

Note:

With After Effects CC April 2017 release, you can use Work with Motion Graphics templates in After Effectsto create graphics, which can be shared and edited in Premiere Pro. The Motion Graphics templates expand on text templates in After Effects.

Export compositions as text templates

You can share After Effects compositions as text templates with Premiere Pro as a single, packaged file that contains all the assets required for that composition. The template behaves like any other imported footage within Premiere Pro, with the added ability to modify the text. Using this feature, you can easily send a text template as a single file to the editor. To make this feature work, you need a free or licensed copy of After Effects installed on the same computer on which you have installed Premiere Pro.

1. Create a composition with one or more text layers.
2. Choose **File > Export > Composition as Text Template** or **Composition > Export Composition as Text Template**.
3. Save the file as a .aecap file. You can import this file in to Premiere Pro and modify the text.

   Note:

   After exporting the .aecap file, you cannot edit it in After Effects.

Creating and editing live text templates

1. Create an After Effects composition with one or more text layers.
2. Animate, add effects, or perform any other action that you want to on the text layer.
3. Click the Lock icon to lock any text layers that you do not want to be edited in Premiere Pro. The locked text layer is not editable in Premiere Pro, but is still visible.
4. Save your After Effects project.
5. In Premiere Pro, click **File > Import** to import the text template.
6. Load the composition in the Source Monitor.

   The After Effects Editable Text category is displayed in the Effect Controls panel in Premiere Pro.
7. Edit the source text items in the Effect Controls panel in Premiere Pro, and verify that the items appear in the content in Premiere Pro. The changes do not affect the original material in After Effects.

   The edited text is sent from Premiere Pro to After Effects and the original text in After Effects is replaced.
8. In After Effects, you can modify the text layer.

   The text is rendered and then sent back to Premiere Pro.

Note:

You can modify the source text in After Effects for one of the text layers where the text was changed in Premiere Pro. The text does not change in Premiere Pro.

See the Live text templates section in Premiere Pro for details specific to Premiere Pro.

Motion Graphics templates

In After Effects, you can add different controls, modify them, and then pack them as shareable Motion Graphics templates. Motion Graphics templates expand on the text templates in After Effects and give more tools to create shareable assets. For more information, see Work with Motion Graphics templates in After Effects.

Creating Motion Graphics templates in After Effects

Creating Motion Graphics templates in After Effects

Chapter 11: Transparency and compositing

Compositing and transparency overview and resources

Compositing overview

To create a composite from multiple images, you can make parts of one or more of the images transparent so that other images can show through. You can make portions of a layer transparent using any of several features in After Effects, including the following:

- Roto Brush and Refine Edge tools in CC (See Roto Brush and Refine Edge)
- Masks (See About masksand Rotoscoping introduction and resources.)
- Mattes (See Track mattes and traveling mattes.)
- Painting on the alpha channel (See Paint with the Brush tool.)
- The Preserve Underlying Transparency layer option (See Preserve underlying transparency during compositing.)
- Keying effects (See Keying.)

To make an entire layer uniformly transparent or semi-transparent, modify its Opacity property.

Layers can also be composited together without modifying the transparency of the layers themselves. For example, you can use blending modes or some of the Channel effects to blend image data from multiple layers into a composite. (See Blending modes and layer styles and .)

After Effects also includes the mocha shape for After Effects (mocha shape AE) plug-in, which converts paths from mocha-AE into mattes in After Effects. (See Resources for Imagineer mocha shape for After Effects.)

Adobe Photoshop is an excellent application for performing many compositing tasks, including defining areas of transparency using its selection and painting tools. You can use Adobe Photoshop together with After Effects for optimum efficiency and best results when doing compositing work.

Online resources for compositing

Mark Christiansen provides a detailed overview of compositing—covering masks, mattes, blending modes, and alpha channels—in a chapter from his After Effects Studio Techniques book posted on the Adobe Press website.

Chris and Trish Meyer provide a tutorial on the Artbeats website that demonstrates how to create a light wrap, so that a foreground element blends in more convincingly with a background.

Rich Young collects tutorials and resources for creating light wraps on the After Effects Portal website.

Rich Young collects resources and tutorials for various methods of creating vignettes.

Chris Zwar provides tips on color keying and compositing on his website.

Jeff Foster provides free sample chapters from his book The Green Screen Handbook: Real World Production Techniques. The sample chapters cover basic compositing, color keying, garbage mattes, hold-out mattes, and how to avoid common problems with greenscreen shots. For more information, see Todd Kopriva's blog.

Compositing fire, explosions, muzzle flashes

Mark Christiansen provides tips and detailed techniques for creating and compositing fire, explosions, muzzle flashes, bullet hits, and energy blasts in the "Pyrotechnics: Creating Fire, Explosions, and Energy Phenomena in After Effects" chapter of After Effects Studio Techniques on the Peachpit Press website.

Compositing fog, smoke, and clouds

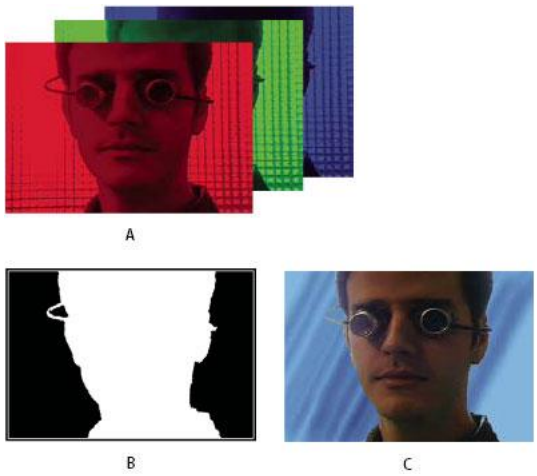
Mark Christiansen provides tips and detailed techniques for creating and compositing fog, smoke, mist, rain, and snow in the "Climate: Air, Water, Smoke, Clouds in After Effects" chapter of After Effects Studio Techniques on the Peachpit Press website.

Daniel Broadway provides tips for compositing fog or mist into a scene on his website.

Alpha channels, masks, and mattes

About alpha channels and mattes

Color information in After Effects is contained in three channels: red (R), green (G), and blue (B). In addition, an image can include an invisible fourth channel, called an *alpha channel*, that contains transparency information. Sometimes, such an image is referred to as an *RGBA* image, indicating that it contains an alpha channel.



Channels at a glance
***A** Separated color channels **B** Alpha channel represented as a grayscale image **C** Composite using all four channels with a background showing through transparent areas*

Many file formats can include an alpha channel, including Adobe Photoshop, ElectricImage, FLV, TGA, TIFF, EPS, PDF, and Adobe Illustrator. AVI and QuickTime (saved at a bit depth of Millions Of Colors+), can also contain alpha channels, depending upon the codec (encoder) used to generate the images stored in these containers. For Adobe Illustrator EPS and PDF files, After Effects automatically converts empty areas to an alpha channel.

When specifying the color depth for an output image, the plus sign (as in Millions Of Colors+) denotes an alpha channel. Similarly, choosing to output to 32 bits per pixel implies an output depth of 8 bits per channel for each of four channels: RGBA.

Some programs can store multiple alpha channels in one image, but After Effects only interprets the fourth channel as an alpha channel.

Note:

The term alpha channel technically refers to the fourth (A) channel in an RGBA image file, regardless of whether that channel is used for communicating transparency information. However, since that fourth channel is used so often to communicate transparency information, the terms alpha and transparency have become nearly synonymous in common usage. It's important to remember, though, that this connection is arbitrary. Some formats may use other channels for transparency information, and other formats may use the fourth channel for something other than transparency information.

The Knoll Unmult plug-in can be used to create an alpha channel from the dark areas of a layer. This works well for a layer with a light effect (such as a lens flare or fire) that you want to composite on top of another layer. For information, see the Red Giant Software website.

When you view an alpha channel in the Composition panel, white indicates complete opacity, black indicates complete transparency, and shades of gray indicate partial transparency.

A matte is a layer (or any of its channels) that defines the transparent areas of that layer or another layer. White defines opaque areas, and black defines transparent areas. An alpha channel is often used as a matte, but you can use a matte other than the alpha channel if you have a channel or layer that defines the desired area of transparency better than the alpha channel does, or in cases where the source image doesn't include an alpha channel.

About masks

A mask in After Effects is a path that is used as a parameter to modify layer attributes, effects, and properties. The most common use of a mask is the modification of an alpha channel of a layer, which determines the transparency of the layer at each pixel. Another common use of a mask is as a path along which to animate text. (See Creating and animating text on a path.)

For more information on paths in general, see About paths.

Default behavior for a drawn mask (left); same mask inverted (right)

Closed-path masks can create transparent areas for a layer. Open paths cannot create transparent areas for a layer but are useful as parameters for an effect. Effects that can use an open or closed mask path as input include Stroke, Path Text, Audio Waveform, Audio Spectrum, and Vegas. Effects that can use closed masks (but not open masks) as input include Fill, Smear, Reshape, Particle Playground, and Inner/Outer Key.

A mask belongs to a specific layer. Each layer can contain multiple masks.

You can draw masks in common geometric shapes—including polygons, ellipses, and stars—with the shape tools, or you can use the Pen tool to draw an arbitrary path.

In most ways, drawing mask paths is the same as drawing shape paths on shape layers, though the editing and interpolation of mask paths have a few additional features. You can link a mask path to a shape path using expressions, which allows you to bring the benefits of masks into shape layers, and vice versa. See Creating shapes and masks and Editing and animating shape paths and masks.

The position of a mask in the stacking order in the Timeline panel affects how it interacts with other masks. You can drag a mask to different positions within the Masks property group in the Timeline panel.

The Mask Opacity property for a mask determines the influence that a closed mask has on the alpha channel of the layer inside the mask area. A Mask Opacity value of 100% corresponds to an interior area that is opaque. The area outside the mask is always transparent. To invert what is considered inside and what is considered outside for a specific mask, select Invert next to the mask name in the Timeline panel.

Copy, cut, save, reuse, and delete masks

You can reuse masks in other layers and compositions, which is especially useful for Bezier masks you've spent a long time perfecting. Mask paths are stored inside a composition in a project file.

Copy, cut, duplicate, or paste a mask

Note:

When working with a mask path—rather than the entire mask, including its other properties—select the Mask Path property. This is especially important when transferring mask paths to shape paths, motion paths, and so on.

- To copy or cut selected masks to the clipboard, choose Edit > Copy or Edit > Cut.
- To duplicate selected masks, choose Edit > Duplicate.
- To paste a mask onto a layer, select the layer and then choose Edit > Paste. If a mask is selected, this operation replaces the selected mask.

Save a mask

1. In the Timeline panel for the composition containing the layer and mask you want to save, expand the layer and its mask properties.
2. Do one of the following:
   - To save an animated mask, select the mask keyframes you want to save.
   - To save a nonanimated mask, select the mask.
3. Copy the mask or keyframes, and paste the mask or keyframes to a new layer. The new layer can be a simple solid.

Create a project with compositions just for storing complex masks. When you want to use a mask from another project, import that project into your current project.

Note:

You can also save masks as animation presets. (See Animation presets.)

Reuse a mask

1. Open the composition containing the mask you want to reuse. If you saved the mask in another project, import the project and then open the composition containing the mask.
2. In the Timeline panel, expand the layer and mask properties for the mask.
3. Select the mask or keyframes.
4. Copy the mask or keyframes, and paste the mask or keyframes to the layer to which you want to apply the mask.

Delete masks

- To delete one mask, select the mask in the Timeline panel and press Delete.
- To delete all masks, select the layer containing the masks you want to remove and choose Layer > Masks > Remove All Masks.

Control mask path color

To help you identify and work with masks, the Composition and Layer panels outline a mask path with color, and the Timeline panel displays that same color next to the name of the mask. By default, After Effects uses the color yellow for all masks. To make each mask more distinctive, you can manually change the color of a mask using the Timeline panel, or you can set After Effects to cycle through mask colors for new masks.

When the Use Contrasting Color For Mask Path preference (under Preferences > Appearance) is enabled, After Effects analyzes the colors near the point where you start drawing a mask. After Effects then chooses a label color that is different from the colors in that region. It also avoids the color of the last mask drawn.

Change mask path color

1. Select the mask in the Timeline panel.
2. Click the color swatch to the left of the mask name, pick a new color, and click OK.

Cycle through colors for mask paths

1. Choose Edit > Preferences > Appearance.
2. Select Cycle Mask Colors.

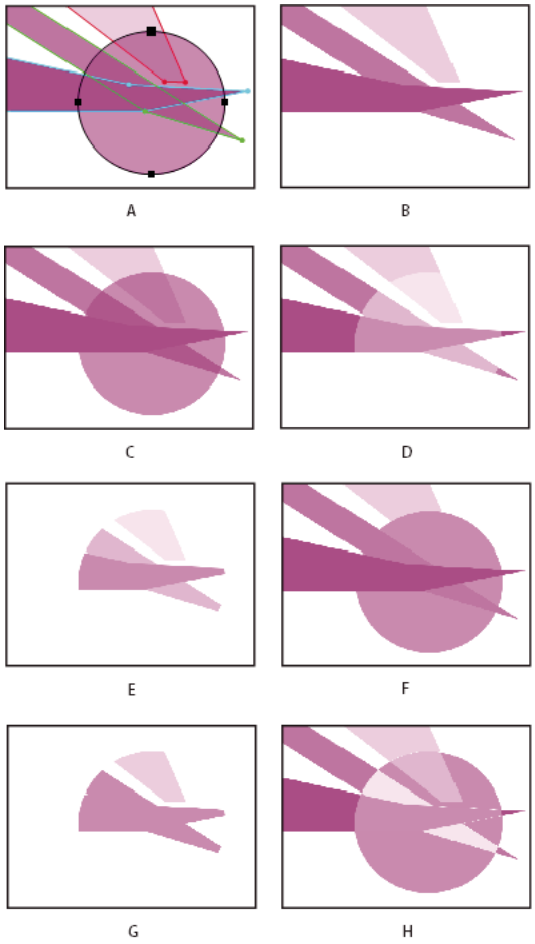
Mask modes

Blending modes for masks (*mask modes*) control how masks within a layer interact with one another. By default, all masks are set to Add, which combines the transparency values of any masks that overlap on the same layer. You can apply a mode to each mask, but you can't animate the mode of a mask—that is, you can't set keyframes or expressions for a mask mode property to make it change over time.

You choose a mask mode for a mask from the menu next to the mask name in the Timeline panel.

The first mask that you create interacts with the alpha channel of the layer. If that channel doesn't define the entire image as opaque, then the mask interacts with the layer frame. Each additional mask you create interacts with masks located above it in the stacking order in the Timeline panel. The results of mask modes vary depending on the modes set for the masks higher in the stacking order. Mask modes only operate between masks on the same layer.

Using mask modes, you can create complex compound masks with multiple transparent areas. For example, you can set a mask mode that combines two masks and sets the opaque area to the areas where the two masks intersect.



Compound masks that result when different modes are applied to the circle mask. The masks in this illustration have different Mask Opacity values.
***A** Original masks **B** None **C** Add **D** Subtract **E** Intersect **F** Lighten **G** Darken **H** Difference*

None The mask has no direct influence on the alpha channel of the layer. This option is useful when you are only using the path of the mask for an effect such as Stroke or Fill, or if you are using the mask path as the basis for a shape path.

Add The mask is added to the masks above it in the stacking order. The influence of the mask is cumulative with the masks above it.

Subtract The influence of the mask is subtracted from the masks above it. This option is useful when you want to create the appearance of a hole in the center of another mask.

Intersect The mask is added to the masks above it in the stacking order. In areas where the mask overlaps the masks above it, the influence of the mask is cumulative with the masks above it. In areas where the mask does not overlap with the masks above it, the result is complete opacity.

Lighten The mask is added to the masks above it in the stacking order. Where multiple masks intersect, the highest transparency value is used.

Darken The mask is added to the masks above it in the stacking order. Where multiple masks intersect, the lowest transparency value is used.

Difference The mask is added to the masks above it in the stacking order. In areas where the mask does not overlap the masks above it, the mask operates as it would alone on the layer. In areas where the mask overlaps the masks above it, the influence of the mask is subtracted from the masks above it.

Use the following keyboard shortcuts to change the mode of a closed mask while you are drawing or modifying it:

Function	Mac	Win
None	*N*	*N*
Subtract	*S*	*S*
Add	*A*	*A*
Intersect	*I*	*I*
Darken	*D*	*D*
Difference	*F*	*F*
Lighten	*L*	*L*

Notes:

- When you draw a new mask with the **Shape** tools such as **Rectangle** tool, and **Ellipse** tool, you can press these keyboard shortcuts along with the mouse.
- When you draw a new mask with the **Pen** tool, you can only press these keyboard shortcuts when you close the mask. To place the pointer over the closing vertex (usually the first vertex), click and hold the mouse button to close the mask, then press the mask mode keyboard shortcut before releasing the mouse button. Open masks do not have a mode. These keyboard shortcuts do not work when drawing open masks with the **Pen** tool.
- When you modify a closed mask, you can press these keyboard shortcuts at any time while you hold down the mouse button.

Expand or contract the edges of a mask

To expand or contract the area influenced by a mask, use the Mask Expansion property.

Mask expansion affects the alpha channel but not the underlying mask path; the mask expansion is essentially an offset that determines how far, in pixels, from the mask path the influence of the mask on the alpha channel extends.

You can scrub the Mask expansion values up to 32,000, and scrub down to -32,000. Earlier versions of After Effects allow scrubbing these values to 1,000 and any value beyond 1000 were manually entered.

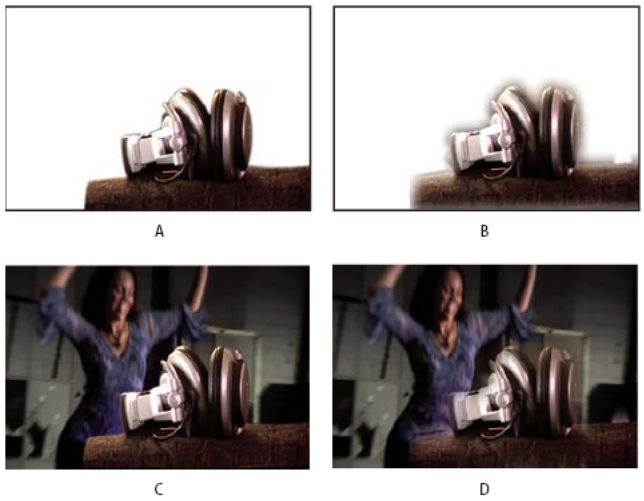
1. In the Timeline panel, expand the Mask properties of the layer you want to adjust.
2. Drag the underlined value for Mask Expansion.

Todd Kopriva provides a visual aid and further explanation regarding mask expansion—and why it creates rounded corners—on his blog on the Adobe website.

Soften (feather) the edges of a mask

Feathering softens the edges of a mask by fading it from more transparent to less transparent over a user-defined distance. Using the Mask Feather property, you make mask edges hard-edged or soft-edged (feathered). By default, the feather width straddles the mask edge, half inside, and half outside. For example, if you set the feather width to 25, the feathering extends 12.5 pixels inside the mask edge and 12.5 pixels outside it.

You can scrub Mask Feather values up to 32,000 using the slider.



Results for different Mask Feather values
***A** Masked layer with 5-pixel feather **B** Masked layer with 40-pixel feather **C** Result with 5-pixel feather **D** Result with 40-pixel feather*

You can also extend or contract the mask edges using the Mask Expansion property to control where the mask feathering appears. (See Expand or contract the edges of a mask.)

Mask feathering takes place only within the dimensions of the layer. Therefore, the path of a feathered mask should always be slightly smaller than the layer area and should never move to the very edge of the layer. If a mask feather extends beyond the layer area, the feathered edge ends abruptly.

1. To display the Mask Feather property for selected layers, press F.
2. (Optional) To constrain horizontal and vertical feather amounts to change proportionally, select the Constrain Proportions switch next to the Mask Feather property.
3. Modify the Mask Feather property as you would any other property—by dragging the underlined value or clicking the underlined value and entering an amount in the text input field.

Note:

Because the mask feather causes the opacity values to vary according to a Gaussian distribution, the area influenced by the feather actually extends beyond the number of pixels specified. The magnitude of the feather's influence beyond the specified feather range is very small. This gradual, Gaussian fall-off appears more natural than a linear fall-off.

Variable-width mask feathering

Earlier versions of After Effects enabled you to add a feathered edge to a closed mask, but the width (extent) of the feather was the same around the mask. A new Mask Feather tool (available in the same tool menu as the Pen tool) has been added to let you define points along a closed mask that should have varying widths.

To create a feather point:

A selected feather point has a small black dot at its handle.

Feather points define both the outer feather boundary and inner feather boundary. If no feather extent handles are inside the mask, the inner feather boundary is the mask path. The mask feather extends from the inner to the outer feather boundary.

To select multiple feather points:

Using the Selection or Mask Feather tool, Shift-click the feather points' extent handles.

To toggle the selection of a feather point:

Shift-click the feather point.

To move a feather point, do either of the following:

- Using the Selection or Mask Feather tool, drag the feather extent handle.

You can move multiple selected feather points in unison by dragging one of them, and scale multiple feather extents by dragging one of the feather extent handles.

You can "sweep" feather points around corner points on a mask.

- With the Mask Feather tool active, press Left or Right Arrow to move the feather along the path, or the Up or Down Arrow to lengthen or shorten the feather's width.

You can move multiple selected feather points, and move longer distances/widths by holding down the Shift key.

To snap a feather point to the mask path:

Drag the feather extent handle across the mask path. It will stop at the mask path.

To control the falloff of the feather:

Choose Layer > Mask > Feather Falloff, and then select one of the following:

- Smooth (default)
- Linear

To adjust the tension (smoothness or curvature) of a feather boundary through a feather point:

Hold down the Alt (Windows) or Option (MacOS) key while dragging from a feather extent handle to adjust the tension. The Info panel shows the current tension for a handle.

To set Hold interpolation for a feather point (for constant feather radius up to the next feather point):

Hold down the Alt (Windows) or Option (MacOS) key while dragging from a feather extent handle to adjust the tension. The Info panel shows the current tension for a handle.

To set Hold interpolation for a feather point (for constant feather radius up to the next feather point):

Enable the Hold option from the context menu above the feather point. The feather point handle changes to be pointy in the direction of constant radius.

To quickly create a feathered edge for a specific mask segment:

Hold down the Shift key as you click the mask segment (between vertices, not above them). The pointer changes to indicate that you are in this mode. Drag from the segment to adjust the extent. Note the following behavior:

- If just two mask vertices are selected, the feathered edge is the contiguous segments between them.
- If both vertices of the clicked segment are selected (that is, the segment is selected), the feathered edge expands to include contiguous selected segments.
- If all or no vertices on the mask are selected, or if the first two conditions don't apply, the feathered edge is only the clicked segment.

To delete a feather point:

Using the Selection or Mask Feather tool, select a feather extent handle, then press Delete. You can delete multiple selected feather points.

Note:

The pointer changes to selection mode instead of delete vertex mode when over a mask vertex.

Tips for variable-width mask feathering (Mask Feather tool)

- Temporarily switch between Pen and Mask Feather tools by holding down the 'G' shortcut.

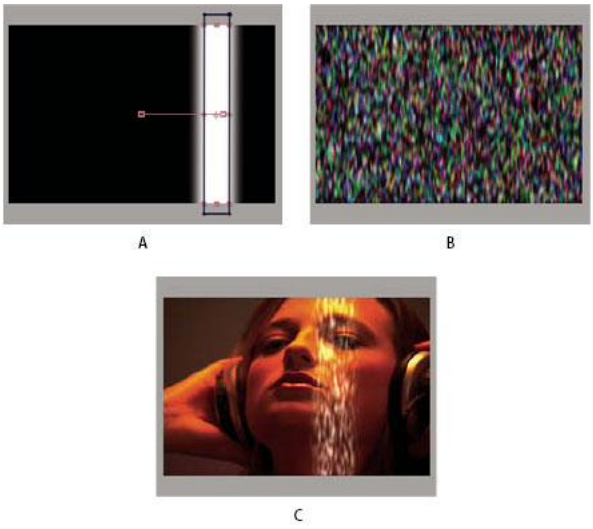
You can turn off this behavior in Edit > Preferences > General (Windows), or After Effects > Preferences > General (Mac OS).

- View information about the number of feather points on a mask, a feather extent's length, position, and tension, and feather falloff setting in the Info panel.
- Hide the feather boundaries for a specific view by deselecting the "Mask Feather Boundaries" option in the View Options dialog box. You can still interact with the boundaries (for example, adding new feather points) where they would've been drawn.
- Control feather point counts across Mask Path keyframes by using the "Preserve Constant Vertex and Feather Count when Editing Masks" option in General preferences.
- Change the value of a feather point's tension, radius, and corner angle from a dialog box by using the commands in the context menu for a feather point. Hold down the Ctrl (Windows) or Cmd (Mac OS) key when hovering over a mask vertex to switch to Selection tool behavior.
- Hold down the Ctrl (Windows) or Cmd (MacOS) key when hovering over a tangent handle to switch to the Convert Vertex tool.

Track mattes and traveling mattes

When you want one layer to show through holes defined by another layer, set up a track matte. For example, you can use a text layer as a track matte for a video layer to allow the video to only show through the shapes defined by the text characters. The underlying layer (the fill layer) gets its transparency values from the values of certain channels in the track matte layer—either its alpha channel or the luminance of its pixels.

Defining the transparency of a layer based on the luminance of the track matte's pixels is useful when you want to create a track matte using a layer without an alpha channel or a layer imported from a program that can't create an alpha channel. In both cases—using alpha channel mattes and using luminance mattes—pixels with higher values are more transparent. Usually, you use a high-contrast matte so that areas are either completely transparent or completely opaque. Intermediate shades should appear only where you want partial or gradual transparency, such as along a soft edge.



Traveling matte
***A** Track matte layer: a solid with a rectangular mask, set to Luma Matte. The mask is animated to travel across the screen. **B** Fill layer: a solid with a pattern effect. **C** Result: the pattern is seen in the shape of the track matte. This is then composited over an additional image layer.*

A track matte only applies to the layer directly beneath it. To apply a track matte to multiple layers, first precompose the multiple layers, and then apply the track matte to the precomposition layer.

After Effects preserves the order of a layer and its track matte after you duplicate or split the layer. Within the duplicated or split layers, the track matte layer remains on top of the fill layer. For example, if your composition contains layers A and B, where A is the track matte and B the fill layer, duplicating or splitting both of these layers results in the layer order ABAB.

If you animate the position or other transformations of the track matte layer, it's called a *traveling matte*. If you want to animate the track matte and fill layers using identical settings, consider precomposing them.

Convert a layer into a track matte

The TrkMat menu shares a column with the blending modes menu. To show the TrkMat menu, make sure that the Modes column is visible. (See Columns.)

1. In the Timeline panel, drag the layer to use as the track matte directly above the layer to use as the fill layer.
2. Define transparency for the track matte by choosing one of the following options from the TrkMat menu for the fill layer:

   No Track Matte No transparency created; next layer above acts as a normal layer.

   Alpha Matte Opaque when alpha channel pixel value is 100%.

   Alpha Inverted Matte Opaque when alpha channel pixel value is 0%.

   Luma Matte Opaque when the luminance value of a pixel is 100%.

   Luma Inverted Matte Opaque when the luminance value of a pixel is 0%.

If you choose an option other than No Track Matte, After Effects converts the next layer above into a track matte, turns off the video of the track matte layer, and adds a track matte icon next to the name of the track matte layer in the Timeline panel.

Note:

Although the video is turned off for the matte layer, you can select the layer to reposition, scale, or rotate it. Select the layer in the Timeline panel, and then drag the center (indicated by a circle with an X) of the layer in the Composition panel.

Using a track matte is similar to using the Preserve Underlying Transparency option, which causes a layer to get its transparency from the transparency of the composite of the layers below it in the layer stacking order. (See Preserve underlying transparency during compositing.)

Tips for working with track mattes

- Use the Levels effect to increase the contrast between light and dark parts of the matte layer. This reduces the problem of having many mid-range values, which translate to partial transparency. (Usually, mattes are most useful when they define areas as entirely transparent or entirely opaque, except at the edges.)
- To use a channel other than the alpha channel of the matte layer as a matte, use one of the Channel effects (such as the Shift Channels effect) to route the desired channel's value into the alpha channel.
- To animate a track matte to move with the layer that it's matting, make the track matte a child of the layer that it's matting. (See Parent and child layers.)

Preserve underlying transparency during compositing

The Preserve Underlying Transparency option causes a layer to get its transparency from the transparency of the composite of the layers below it in the layer stacking order. In other words, the opaque areas of the layer with this option selected appear only when positioned over opaque areas in underlying layers. This behavior is similar to the behavior of a track matte, except that a track matte can only be a single layer and a track matte must be above the layer in the layer stacking order. (See Track mattes and traveling mattes.)

This option is useful for creating results such as glints or light reflecting off a polished surface.

The behavior of a layer with the Preserve Underlying Transparency option selected is similar to the behavior of a clipping mask in Adobe Photoshop.

? Select the T option in the Modes column for the layer.

Aharon Rabinowitz provides a short video tutorial about the Preserve Underlying Transparency option on the Creative COW website.

Tim Clapham provides an explanation and demonstration on his website of the Preserve Underlying Transparency switch.

Resources for Imagineer mocha shape for After Effects

After Effects includes Imagineer Systems mocha for After Effects (mocha-AE), a stand-alone planar tracking application that can export tracking data for use in compositions in After Effects. (See Resources for mocha for After Effects (mocha-AE).)

After Effects also includes the mocha shape for After Effects (mocha shape) plug-in, which converts paths from mocha-AE into mattes in After Effects.

You don't apply the mocha shape effect to a layer directly. Rather, you copy path data to the clipboard in the mocha-AE application and then paste it onto a layer in After Effects. The paths from mocha-AE are converted to instances of the mocha shape effect to create a matte.

The Imagineer website provides several video tutorials and other resources for learning to use mocha-AE and mocha shape with After Effects.

Chris and Trish Meyer provide tips about mocha-AE and mocha shape, including tips about variable-width feather, in an article on the ProVideo Coalition website.

Keying

Keying introduction and resources

Note:

When a background is not of a consistent and distinctive color, you can't remove the background with keying effects. Under these conditions, you may need to use rotoscoping—the manual drawing or painting on individual frames to isolate a foreground object from its background. (See Rotoscoping introduction and resources.)

About keying: color keys, luminance keys, and difference keys

Keying is defining transparency by a particular color value or luminance value in an image. When you *key out* a value, all pixels that have colors or luminance values similar to that value become transparent.

Keying makes it easy to replace a background, which is especially useful when you work with objects too complex to mask easily. When you place a keyed layer over another layer, the result forms a composite, in which the background is visible wherever the keyed layer is transparent.

You often see composites made with keying techniques in movies, for example, when an actor appears to dangle from a helicopter or float in outer space. To create this effect, the actor is filmed in an appropriate position against a solid-color background screen. The background color is then keyed out and the scene with the actor is composited over a new background.

The technique of keying out a background of a consistent color is often called *bluescreening* or *greenscreening*, although you don't have to use a blue or green screen; you can use any solid color for a background. Red screens are often used for shooting non-human objects, such as miniature models of cars and space ships. Magenta screens have been used for keying work in some feature films renowned for their visual effects. Other common terms for this kind of keying are *color keying* and *chroma keying*.

Difference keying works differently from color keying. Difference keying defines transparency with respect to a particular baseline background image. Instead of keying out a single-color screen, you can key out an arbitrary background. To use difference keying, you must have at least one frame that contains only the background; other frames are compared to this frame, and the background pixels are made transparent, leaving the foreground objects. Noise, grain, and other subtle variations can make difference keying very difficult to use in practice.

Keying effects, including Keylight

After Effects includes several built-in keying effects, as well as the Academy Award-winning Keylight effect, which excels at professional-quality color keying. (See and .)

For information on the Keylight effect, see its documentation in the folder in which the Keylight plug-in is installed, or on the Foundry website.

Note:

Though the color keying effects built into After Effects can be useful for some purposes, you should try keying with Keylight before attempting to use these built-in keying effects. Some keying effects—such as the Color Key effect and the Luma Key effect—have been superseded by more modern effects like Keylight.

The Key Cleaner and Advanced Spill Suppressor effects are most effective when applied together, in that order, after a keying effect like Keylight.

Use the Keylight + Key Cleaner + Advanced Spill Suppressor animation preset (located in the Image-Utilities presets folder) to apply all the three effects. The Advanced Spill Suppressor effect is turned off by default to allow you to sample the key color in the Keylight effect or if the footage does not have any color spill to be removed. For more information, see .

Mark Christiansen provides tips and techniques for using Keylight in an excerpt from his book After Effects Studio Techniques: Visual Effects and Compositing on the Peachpit Press website. In an excerpt from the "Color Keying in After Effects" chapter of After Effects Studio Techniques, Mark Christiansen provides detailed tips and techniques for color keying, including advice on which keying effects to avoid and how to overcome common keying challenges.

For a step-by-step tutorial demonstrating the use of the Color Difference Key effect, the Matte Choker effect, the Spill Suppressor effect, and garbage masks, see the "Keying in After Effects" chapter of the After Effects Classroom in a Book on the Peachpit Press website.

Jeff Foster provides free sample chapters from his book The Green Screen Handbook: Real World Production Techniques. The sample chapters cover basic compositing, color keying, garbage mattes, hold-out mattes, and how to avoid common problems with greenscreen shots. For more information, see the Adobe website.

Rich Young collects more tips and resources for keying on his After Effects Portal website.

Tips on color keying and compositing from experienced compositor, Chris Zwar.

Note:

Keep in mind that generating a high-quality key can require the application of multiple keying effects in sequence and careful modification of their properties, especially if the footage was shot without considering the requirements of the compositor.

Shooting and acquiring footage for keying

For tips on shooting footage so that color keying is easier and more successful, see Jonas Hummelstrand's General Specialist website.

- Light your color screen uniformly, and keep it free of wrinkles.
- Start with the highest-quality materials you can gather, such as film that you scan and digitize.
- Use uncompressed footage (or, at least, files with the least possible amount of compression). Many compression algorithms, especially the algorithms used in DV, HDV, and Motion JPEG, discard subtle variations in blue—which may be necessary to create a good key from a bluescreen. Use footage with the least color subsampling possible—for example, 4:2:2 rather than 4:2:0 or 4:1:1. (For information about color subsampling, see the Wikipedia website and the Adobe website.)

Robbie Carman and Richard Harrington provide an excerpt on the Peachpit website from their book *Video Made On A Mac* that demonstrates how to plan, shoot, key, and composite a greenscreen shot.

Tips for keying with After Effects

- Use a garbage matte to roughly outline your subject so that you don't have to waste time keying out parts of the background far from the foreground subject. (See Use a garbage matte.)
- Use a hold-out matte to roughly protect areas that are of a similar color to the background from being keyed out. (See Use a hold-out matte.)

- To help you view transparency, temporarily change the background color of the composition, or include a background layer behind the layer you are keying out. As you apply the keying effect to the layer in the foreground, the composition background (or a background layer) shows through, making it easy to view transparent areas. (See Composition settings.)
- For evenly lit footage, adjust keying controls on only one frame. Choose the most intricate frame of the scene, one involving fine detail such as hair and transparent or semitransparent objects, such as smoke or glass. If the lighting is constant, the same settings you apply to the first frame are applied to all subsequent frames. If lighting changes, you may need to adjust keying controls for other frames. Place keyframes for the first set of keying properties at the start of the scene. If you are setting keyframes for one property only, use Linear interpolation. For footage that requires keyframes for multiple interacting properties, use Hold interpolation. If you set keyframes for keying properties, you may want to check the results frame by frame. Intermediate keying values may appear, producing unexpected results.
- To key well-lit footage shot against a color screen, start with the Color Difference Key. Add the Advanced Spill Suppressor effect to remove traces of the key color, and then use one or more of the other Matte effects, if necessary. If you are not satisfied with the results, try starting again with the Linear Color Key.
- To key well-lit footage shot against multiple colors or unevenly lit footage shot against a bluescreen or greenscreen, start with the Color Range key. Add the Advanced Spill Suppressor and other effects to refine the matte. If you are not completely satisfied with the results, try starting with or adding the Linear Color Key.
- Using the Key Cleaner and the Advanced Spill Suppressor effect in sequence is the best way to go about applying Keying effects. You can use the Keylight effect in combination with the Key Cleaner and Advanced Spill Suppressor effects in that order on a layer using the Keylight+Key Cleaner+Advanced Spill Suppressor animation preset in the Image-Utlities folder under Animation Presets. The Advanced Spill Suppressor effect is turned off by default to allow you to sample the key color in the Keylight effect or if the footage does not have any color spill to be removed. For more information, see .
- To key dark areas or shadows, use the Extract Key on the Luminance channel.
- To make a static background scene transparent, use the Difference Matte Key. Add the Simple Choker and other effects as needed to refine the matte.
- After you have used a key to create transparency, use Matte effects to remove traces of key color and create clean edges.
- Blurring the alpha channel after keying can soften the edges of the matte, which can improve compositing results.

Use a garbage matte

A *garbage matte* (or *junk matte*) removes unneeded portions of the scene, resulting in a rough area that contains only the subject that you want to keep. When you are working with a poorly lit or uneven color screen (for example, a bluescreen or greenscreen), sketching a garbage matte around the subject can greatly reduce the amount of work that you have to do in keying out the background. However, if you spend a lot of time making a perfect garbage matte that exactly outlines the subject—essentially rotoscoping—you lose the time-saving advantage of keying.

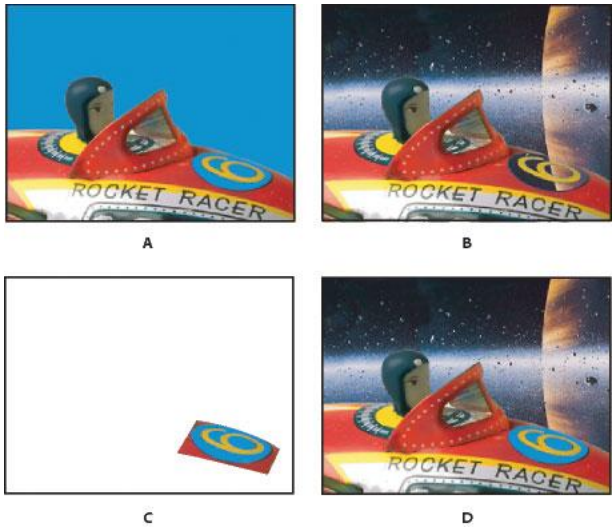
1. Create a mask to roughly outline a subject.
2. Apply one or more keying effects to mask out the remainder of the background.
3. Apply Matte effects as necessary to fine-tune the matte.

Aharon Rabinowitz provides a video tutorial on the Creative COW website that shows how to create a super-tight garbage matte using Auto-trace.

Use a hold-out matte

Use a *hold-out matte* (also known as a *hold-back matte*) to patch a scene to which a keying effect has been applied.

A hold-out matte is a masked-out portion of a duplicate of a layer that you have keyed. The duplicate is masked to include only the area of the image that contains the key color that you want to preserve as opaque. The hold-out matte is then placed directly on top of the keyed layer.



Example of using a hold-out matte
***A** Original bluescreen image. The background for the number is also blue.* ***B** After keying, the background for the number is also transparent.* ***C** Hold-out matte containing the part of the image you want to remain opaque* ***D** When the hold-out matte is placed on top of the keyed image, the background for the number is now opaque.*

1. Duplicate the layer containing the color screen.
2. Apply keying effects and Matte effects to the original layer to create transparency.
3. On the duplicate layer, create masks to mask out everything in the image except the area that you want to preserve.
4. Make sure that the copy (the hold-out matte) is positioned directly on top of the keyed layer.

   Note:

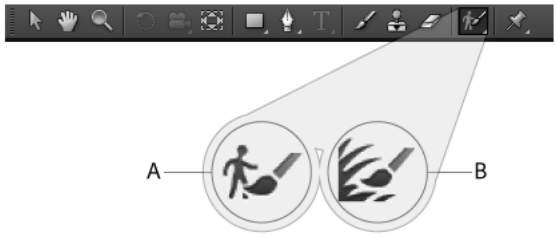
   Don't change Transform properties of only one of the layers after making the duplicate; keep the layers moving together. Consider parenting one to the other. (See Parent and child layers.)

Roto Brush, Refine Edge, and Refine Matte effects

Separating a foreground object, such as an actor, from a background is a crucial step in many visual effects and compositing workflows. When you've created a matte that isolates an object, you can replace the background, selectively apply effects to the foreground, and much more.

Roto Brush & Refine Edge tools

The Roto Brush tool and the Refine Edge tool provide an alternative, faster workflow for segmentation and creation of a matte.



***A** Roto Brush **B** Refine Edge*

Roto Brush

Use this tool to create the initial matte to separate an object from its background. With the Roto Brush tool, you draw strokes on representative areas of the foreground and background elements. Then After Effects uses that information to create a segmentation boundary between the foreground and background elements. The strokes that you make on one area helps After Effects differentiate between foreground and background on adjacent frames. Various techniques are used to track regions across time, and this information is used to propagate segmentation forward and backward in time. Each stroke that you make is used to improve the results on nearby frames. Even if an object moves or changes shape from one frame to the next, the segmentation boundary adapts to match the object.

Using the Roto Brush effect

Using the Roto Brush effect

Refine Edge tool

Use the Refine Edge tool to improve the existing matte by creating partial transparency along areas that contain fine details such as hair or fur.

Introduction to Refine Edge tool

Introduction to Refine Edge tool

Roto Brush & Refine Edge effect

This effect is applied automatically when the first Roto Brush or Refine Edge stroke is drawn in the layer panel. Use this effect to control the settings for the Roto Brush & Refine Edge tools. After you have created a segmentation boundary and the boundary edges that need refining, use the Roto Brush Matte and Refine Edge Matte properties to improve the matte.

- **Strokes, spans, and base frames**

  When you first draw a Roto Brush stroke, the frame on which you are drawing becomes a base frame. The segmentation information is propagated forward and backward through time—20 frames forward and 20 frames backward. (Segmentation information is the information about what is defined as foreground and what is defined as background.) The range of frames thus influenced by this base frame is its Roto Brush & Refine Edge span. Little arrows in the span bar in the Layer panel show the direction in which the information is being propagated. If you draw a corrective stroke anywhere where the arrows point to the right, the information from that stroke is propagated forward; if you draw a corrective stroke anywhere where the arrows point to the left, information from that stroke is propagated backward. If you draw a stroke anywhere outside of a Roto Brush span, then you create a new base frame and span.

  You can work your way forward a frame at a time from a base frame, making corrective strokes, and you don't have to worry about your strokes changing results on frames that you've already worked on. You can do the same thing going backward from a base frame.

  The influence of each corrective stroke propagates forward or backward to affect all frames in that direction within the span, regardless of when the stroke is made. For example, if the base frame is at frame 10, you make a corrective stroke at frame 20, and then you make a corrective stroke at frame 15, then frame 20 will be affected by both of these corrective strokes—just as if you had made the corrective strokes in the other order.

  Each time that you make a stroke within a span, the span grows, unless it can't because the span in which you're drawing is adjacent to another span.

  - To manually change a span duration, drag either end of a span.
  - To delete a span, right-click (Windows) or Control-click (Mac OS) a span and choose Remove Span.
  - To delete all spans, delete the instance of the Roto Brush & Refine Edge effect.

  When you move to a frame within a span, After Effects must calculate how the stroke information from the other frames in the span affects the frame to which you've moved. The Info panel shows the message “Roto Brush propagating” as this calculation is being performed. This information is cached, so this propagation doesn't need to happen every time that you move to a frame. Green bars in a span indicate frames with cached information. Choosing Edit > Purge Image Caches purges Roto Brush & Refine Edge caches, too.

- **Tips for working with the Roto Brush and Refine Edge tools**

  - When drawing strokes to define a foreground object with the Roto Brush tool, begin by drawing strokes along the center of the object’s features. For example, draw a stroke along the skeleton rather than along the outline of an arm. Unlike conventional rotoscoping, which requires precise manual definition of boundaries, using the Roto Brush tool works by defining representative regions. After Effects can then extrapolate from those regions to determine where the boundaries are. Before you draw a stroke along a boundary to attempt to get a precise segmentation, be sure that you've drawn foreground strokes down the center of the object and made at least some rough background strokes on the other side of the boundary.
  - If you draw a Roto Brush or Refine Edge stroke over the wrong area of the image, undo that stroke. However, if After Effects misinterprets your Roto Brush stroke and includes or excludes too much of the image, don’t undo; further teach Roto Brush by drawing additional strokes to include or exclude regions.

- Work with resolution set to Full when using the Roto Brush or Refine Edge tools. Fast Previews modes, such as Adaptive Resolution, don't work well with these tools, because switching resolutions requires a full recalculation of the segmentation and transparency information. For this reason, Fast Previews modes are turned off when you draw a Roto Brush or Refine Edge stroke. Both the Composition and Layer panels share the Fast Previews setting.
- Use the Roto Brush and Refine Edge tools in a composition with a frame rate set to match the frame rate of the layer's source footage item. A warning banner appears at the bottom of the frame in the Composition panel if the frame rate of the composition doesn't match the frame rate of the layer's source footage item.
- When you've gotten everything as good as you can with the Roto Brush & Refine Edge effect, you can touch up the matte further using other compositing features in After Effects—such as by painting on the alpha channel.

Roto Brush & Refine Edge workflow

1 Switch to the **Roto Brush** or **Refine Edge** tool by pressing Alt+W (Windows) or Option+W (Mac OS).

Note: Once selected, you can press Alt+W (Windows) or Option+W (Mac OS) to toggle between these tools.

2 Open the layer in the **Layer** panel.

Note:

*When the **Roto Brush** or **Refine Edge** tool is active, double-clicking a layer in the **Timeline** or **Composition** panel opens the layer in the Layer panel by default. Uncheck **Open Layer panel when Double-clicking with Paint, Roto Brush, and Refine Edge Tools** option under **General Preferences**.*

3 Preview the movie in the **Layer** panel to find a frame in which the greatest amount of the foreground object is in the frame and in which the separation between the foreground and background is as clear as possible.

The frame on which you draw your first stroke is a base frame. (See Roto Brush & Refine Edge workflow.)

4 Drag in the **Layer** panel to draw a foreground stroke on the object that you want to isolate from the background. When you are drawing a foreground stroke, the **Roto Brush** tool's pointer is a green circle with a plus sign in the middle.

Note:

Draw the stroke down the center of the object, not along the edge. (See Tips for working with the Roto Brush tool.)

Draw a stroke to select the foreground

The magenta outline that appears around the foreground object in Alpha Boundary view mode is the *segmentation boundary*, the rough line that separates the foreground from the background. You can also view the segmentation using other view modes. (See Layer panel view options.)

5 Alt-drag (Windows) or Option-drag (Mac OS) to draw a background stroke on the area that you want to define as the background. When you are drawing a background stroke, the **Roto Brush** tool's pointer is a red circle with a minus sign in the middle.

Draw a background stroke to exclude an area

6 Repeat the steps of drawing foreground and background strokes on the base frame until the segmentation is as precise and complete as possible. You should make the segmentation on the base frame as good as possible; the segmentation of other frames is based on the segmentation defined on the base frame.

Try for a segmentation boundary that is within a couple of pixels of your desired edge. You can modify properties in the Roto Brush & Refine Edge effect, such as Feather and Contrast to refine the initial segmentation further. (See Roto Brush & Refine Edge, Refine Hard Matte, and Refine Soft Matte effect reference.)

You can resize the Roto Brush tool's tip to make finer strokes. Broad strokes are best for initial work, but fine strokes are useful for details. (See Roto Brush strokes, spans, and base frames.)

7 Press Page Down or 2 to move forward one frame.

After Effects uses motion tracking, optical flow, and various other techniques to propagate the information from the base frame to the current frame to determine the segmentation boundary.

8 If the segmentation boundary that After Effects calculates for the current frame is not where you want it to be, you can make corrective strokes to teach After Effects what is foreground and what is background. Draw foreground strokes and background strokes as needed to correct the segmentation. Corrective strokes propagate in one direction, away from the base frame.

Note: You can also modify properties in the **Roto Brush Propagation** property group to affect how After Effects propagates the segmentation information from previous frames to the current frame. (See Roto Brush & Refine Edge, Refine Hard Matte, and Refine Soft Matte effect reference.)

9 Repeat the steps of moving one frame at a time and making corrective strokes until you have created a segmentation boundary for the entire duration that you want to segment.

10 If you have drawn Roto Brush strokes, the **Fine-tune Roto Brush Matte** option is enabled in the Roto Brush & Refine Edge effect properties. Modify properties in the Roto Brush Matte property group as needed. (See Roto Brush & Refine Edge, Refine Hard Matte, and Refine Soft Matte effect reference.)

11 Go back to the base frame and switch to the Refine Edge tool. Draw Refine Edge strokes for areas that need partial transparency. Draw the strokes along or across the edge of the matte indicated by a magenta line. When you are drawing a Refine Edge stroke, the Refine Edge tool's pointer is a blue circle with a plus sign in the middle. The first refine Edge stroke changes the view to Refine Edge X-ray view mode. See Layer panel view options.

You should make the refinement strokes on the base frame as good as possible and cover all areas that contain a mixture of foreground and background; the refinement of other frames is based on the initial refinement areas defined on the base frame.

Draw a Refine Edge stroke to mark areas of partial transparency

12 Repeat and use the Refine Edge tool on other frames until the refinement is as precise and complete as possible. Press Alt/Option to erase Refine Edge strokes.

13 If you've used the Refine Edge brush, the **Fine-tune Refine Edge Matte** option in the Roto Brush & Refine Edge effect properties is selected. Modify properties in the Refine Edge Matte property group as needed. (See Roto Brush & Refine Edge, Refine Hard Matte, and Refine Soft Matte effect reference.)

When you are done, click the Freeze button in the lower-tight corner of the Layer panel to cache, lock, and save the Roto Brush & Refine Edge propogation information. (See Freezing (caching, locking, and saving) Roto Brush segmentation.)

From an expert: Refine Edge Tool

From an expert: Refine Edge Tool

Freezing (caching, locking, and saving) Roto Brush segmentation

When the View menu in the Layer panel is set to Roto Brush & Refine Edge, a Freeze button appears in the lower-right corner of the Layer panel. Click this button to cache and lock segmentation for all Roto Brush & Refine Edge spans for the layer within the composition work area. This preserves the matte and saves it with the project, preventing the Roto Brush & Refine Edge effect from re-propogating the segmentation when you open the project again or make changes.

If After Effects has already calculated segmentation information for a frame when you click the Freeze button, then this information is cached. If the segmentation has not been calculated for a frame within a Roto Brush & Refine Edge span, then After Effects must calculate the segmentation before freezing.

Frames with frozen (cached and locked) segmentation information are represented by blue bars in the Roto Brush & Refine Edge span view in the Layer panel.

Note:

If you click Stop in the dialog box, After Effects stops adding frames to the cache, but Roto Brush & Refine Edge segmentation is still locked with the segmentation information cached up until the point that you clicked Stop.

To unfreeze Roto Brush & Refine Edge segmentation, click the Freeze button again.

When Roto Brush & Refine Edge segmentation is frozen, you can place the pointer over the Freeze button to see a tooltip that tells you when the cached information was created.

When Roto Brush & Refine Edge segmentation is frozen, the pointer for the Roto Brush & Refine Edge tools has a slash through it. It indicates that new strokes won't affect the result untill you unfreeze.

The information that is cached and locked is the result of Roto Brush & Refine Edge strokes and the properties in the Roto Brush Propagation property group of the Roto Brush & Refine Edge effect. Making changes to any of these items (for example, by drawing new Roto Brush strokes or modifying properties in the Roto Brush Propagation property group) has no influence on the result of the Roto Brush & Refine Edge effect until you unfreeze segmentation. The properties in the Roto Brush Matte and Refine Edge Matte property groups are not frozen.

Frozen Roto Brush & Refine Edge segmentation information is cached and locked while the application is running, and the cached information is saved with the project.

Layer panel view options

You can choose these view modes from the Show Channel menu in the Layer panel, by clicking the buttons in the Layer panel, or by using keyboard shortcuts. You can use the controls at the bottom of the Layer panel to change the color and opacity of the overlays used in Alpha Boundary and Alpha Overlay mode.

Refine Edge X-ray Shows areas of partial transparency created by the Refine Edge strokes as an X-ray. (Alt+X or Option+X). When you change Roto Brush & Refine Edge parameters that aren't visible in the X-ray view (for example, Chatter Reduction), the view switches back to the previous view so you can see the result of the change.

Alpha Shows alpha channel of the layer (Alt+4 or Option+4).

Alpha Boundary Shows source layer with foreground and background unchanged, with segmentation boundary overlaid as a colored outline (Alt+5 or Option+5).

Alpha Overlay Shows source layer with foreground unchanged and background overlaid with a solid color (Alt+6 or Option+6).

Note:

The Refine Edge X-ray, Alpha Boundary, and Alpha Overlay view modes are turned off when the View menu in the Layer panel is changed to anything other than Roto Brush and Refine Edge tools.

Refine Hard Matte and Refine Soft Matte effects

Use the Refine Hard Matte and Refine Soft Matte effects to fine-tune a matte created using traditional methods such a creating masks or color keying. The properties and controls of these effects are similar to those in the Roto Brush & Refine Edge effect.

Refine Hard Matte Use the **Refine Hard Matte** effect to improve the edges of an existing hard-edged alpha channel. The **Refine Hard Matte** effect is an updated version of the **Refine Matte** effect in After Effects CS5-CS6.

Refine Soft Matte Use the new **Refine Soft Matte** effect to define a soft matte. This effect uses additional processing to automatically calculate finer edge details and transparent areas.

Roto Brush & Refine Edge, Refine Hard Matte, and Refine Soft Matte effect reference

The Roto Brush & Refine Edge effect properties in the Roto Brush Propagation property group affect segmentation between foreground and background and how that segmentation information is used for contiguous frames in a span. Other properties of the Roto Brush & Refine Edge effect affect the matte that is generated based on the initial segmentation. The Refine Hard Matte effect is similar to the Roto Brush Matte, with additional options such as Use Motion Blur and Decontaminate Edge Colors properties. The Refine Soft Mattte effect is similar to Refine Edge Matte with additional options such as Use Motion Blur and Decontaminate Edge Colors.

- **Roto Brush and Refine Edge effect**

Property	Description
Roto Brush Propagation	Properties in the Roto Brush Propagation property group (except for View Search Region) affect all Roto Brush calculations. Any change to these properties requires a recalculation and propagation of the segmentation information from a base frame. Also, the results on a base frame itself are not affected by changes to these properties; therefore, it's best to change these properties when the current-time indicator is a frame or two away from a base frame, so that you can see the result of the changes.
Search Radius	The radius of the area within which After Effects searches when looking for pixels that match from one frame to the next. You can change how the search radius adapts to regions with more or less motion using the Motion Threshold and Motion Damping properties. If the search radius is too small, some motion may be missed; if the search radius is too large, extraneous motion may be detected.
Motion Threshold and Motion Damping	These two properties control how the search region is constrained based on motion. Change Motion Threshold to set the motion level below which is considered no motion, where the search region will shrink to nothing. Motion Damping affects the remaining areas that are considered to be in motion. As you increase Motion Damping, the search region is tightened, with slow-moving areas tightening more than fast-moving areas. Constraining the search region in areas with little motion can reduce edge chatter in these regions. Constraining the search region too much will cause the automatic boundary detection to fall off the edge of the object.
View Search Region	Renders the search region as yellow, and the foreground and background as a grayscale image (with the background dimmer than the foreground). The value of this property affects the rendered output of the Roto Brush & Refine Edge effect, not just an intermediate stage of the effect's operation. Its main use is to help you pick values for Search Radius, Motion Threshold, and Motion Damping.
Edge Detection	Choose whether to favor the segmentation boundary calculated for the current frame in isolation or the segmentation calculated based on the previous frame when determining the edge between foreground and background. The Balanced option considers the current frame and surrounding frames equally. Foreground objects with colors that match the background will usually benefit from Favor Predicted Edges.

Use Alternate Color Estimation	Subtly changes the process by which the effect determines what is foreground and what is background. Sometimes checking it helps with segmentation; sometimes it doesn't.
Invert Foreground/Background	Inverts which strokes are considered foreground strokes and which strokes are considered background strokes in the segmentation phase.
Fine-tune Roto Brush Matte	Enable or disable finer adjustments for Roto Brush Matte. These controls are used to adjust the segmentation boundary defined by foreground and background strokes.
Roto Brush Matte	Properties under the Roto Brush Matte group affect the Roto Brush matte, and are used to adjust the segmentation boundary defined by foreground and background strokes. Areas marked by the Refine Edge tool are not affected by the properties in this group.
Feather	Increasing this value reduces the sharpness of the curves in the segmentation boundary by smoothing along the edge.
Contrast	Contrast of the segmentation boundary. This property does nothing if Feather is 0. Unlike the Feather property, Contrast applies across the edge.
Shift Edge	The amount of expansion of the matte relative to the value of the Feather property. The result is very similar to that of the Choke property in the Matte Choker effect, but the value is given from -100% to 100% (instead of -127 to 127).
Reduce Chatter	Increase this property to reduce erratic changes to edges from one frame to the next. This property determines how much influence the current frame should have when performing a weighted average across adjacent frames to make the matte edges not move erratically from one frame to the next. If the Reduce Chatter value is high, the chatter reduction is strong, and the current frame is considered less. If the Reduce Chatter value is low, the chatter reduction is weak, and the current frame is considered more. If the Reduce Chatter value is 0, only the current frame is considered for matte refinement. Tip: If the foreground object isn't moving, but the matte edges are moving and changing, increase the value of the Reduce Chatter property. If the foreground object is moving, but the matte edge isn't moving, decrease the value of the Reduce Chatter property.
Render Refine Edge	Determines if the result of the entire effect is rendered. Disable it to render results from Roto Brush only while excluding the results from the Refine Edge.
Base Refine Edge Radius	Adds a uniform band along the entire segmentation boundary that behaves like a hand-drawn stroke with the Refine Edge tool on each base frame. The width of the strokes is determined by this value. If you use a non-zero Base Refine Edge Radius value, it effectively makes edges that were previously only defined by Roto Brush strokes as if they were drawn using Refine Edge Strokes.
Fine-tune Refine Edge Matte	Enable or disable the property group for Refine Edge Matte. These controls are used to control Refine Edge parameters.
Refine Edge Matte	The properties under this group determine the Refine Edge properties. The properties do not affect the entire layer, but only the area defined by the Refine Edge strokes.

Smooth	Smoothens along the alpha boundary, preserving semi-transparent detail across the boundary.
Feather	Blurs the alpha channel in the refined area.
Contrast	Contrast of the alpha channel in the refined area.
Shift Edge	The amount of expansion of the matte relative to the value of the Feather property. The result is very similar to that of the Choke property in the Matte Choker effect, but the value is given from -100% to 100% (instead of -127 to 127).
Chatter Reduction	Enable or disable Chatter Reduction. Choose More Detailed or Smoother (Slower).
Reduce Chatter	Increase this property to reduce erratic changes to edges from one frame to the next. Max of 100% for More Detailed, max of 400% for Smoother (Slower).
Use Motion Blur	Check this option to render the matte with motion blur. The high-quality option is slower, but generates a cleaner edge. You can also control the number of samples and the shutter angle, which have the same meaning as they do in the context of motion blur in the composition settings.
Decontaminate Edge Colors	Check this option to decontaminate (clean) the color of edge pixels. The background color is removed from foreground pixels, which helps to fix halos and the contamination of motion-blurred foreground objects with background color. The strength of this cleaning is determined by Decontamination Amount.
Decontaminate Amount	Determines the strength of the Decontaminate Edge Colors.
Extend Where Smoothed	Only functional when Reduce Chatter is greater than 0 and Decontaminate Edge Colors is selected. Edges that are moved in order to reduce chatter are cleaned.
Increase Decontamination Radius	Amount (in pixels) by which to increase the radius value for the cleaning of edge colors, in addition to any cleaning that covers feather, motion blur, and extended decontamination.
View Decontamination Map	Shows which pixels will be cleaned by decontamination of edge colors (white pixels in the map).

- **Refine Hard Matte effect**

Property	**Description**
Feather	Increasing this value reduces the sharpness of the curves in the matte by smoothing along the edge.
Contrast	Determines the contrast of the matte. This property does nothing if Feather is 0. Unlike the Feather property, Contrast applies across the edge.
Shift Edge	The amount of expansion of the matte relative to the value of the Feather property. The result is very similar to that of the Choke property in the Matte Choker effect, but the value is given from -100% to 100% (instead of -127 to 127).

Reduce Chatter	Increase this property to reduce erratic changes to edges from one frame to the next. This property determines how much influence the current frame should have when performing a weighted average across adjacent frames to make the matte edges not move erratically from one frame to the next. If the Reduce Chatter value is high, the chatter reduction is strong, and the current frame is considered less. If the Reduce Chatter value is low, the chatter reduction is weak, and the current frame is considered more. If the Reduce Chatter value is 0, only the current frame is considered for matte refinement. Tip: If the foreground object isn't moving, but the matte edges are moving and changing, increase the value of the Reduce Chatter property. If the foreground object is moving, but the matte edge isn't moving, decrease the value of the Reduce Chatter property.
Use Motion Blur	Check this option to render the matte with motion blur. The high-quality option is slower, but generates a cleaner edge. You can also control the number of samples and the shutter angle, which have the same meaning as they do in the context of motion blur in the composition settings. In the Refine Hard Matte effect, if you want any motion blur you'll need this on.
Decontaminate Edge Colors	Check this option to decontaminate (clean) the color of edge pixels. The background color is removed from foreground pixels, which helps to fix halos and the contamination of motion-blurred foreground objects with background color. The strength of this cleaning is determined by Decontamination Amount.
Decontaminate Amount	Determines the strength of decontamination.
Extend Where Smoothed	Only functional when Reduce Chatter is greater than 0 and Decontaminate Edge Colors is selected. Edges that are moved in order to reduce chatter are cleaned.
Increase Decontamination Radius	Amount (in pixels) by which to increase the radius value for the cleaning of edge colors, in addition to any cleaning that covers feather, motion blur, and extended decontamination.
View Decontamination Map	Shows which pixels will be cleaned by decontamination of edge colors (white pixels in the map).

- **Refine Soft Matte effect**

Property	Description
Calculate Edge Details	Computes semi-transparent edges, pulling out details within the edge region.
Additional Edge Radius	Adds a uniform band along the entire refinement boundary that behaves like a hand-drawn stroke with the Refine Edge tool on each base frame. The width of the stroke is determined by this value.
View Edge Region	Renders the edge region as yellow, and the foreground and background as a grayscale image (with the background dimmer than the foreground).
Smooth	Smoothens along the alpha boundary, preserving semi-transparent detail across the boundary.
Feather	Blurs the alpha channel in the refined area.

Contrast	Contrast of the alpha channel in the refined area.
Shift Edge	The amount of expansion of the matte relative to the value of the Feather property. The result is very similar to that of the Choke property in the Matte Choker effect, but the value is given from -100% to 100% (instead of -127 to 127).
Chatter Reduction	Enable or disable Chatter Reduction. Choose More Detailed or Smoother (Slower).
Reduce Chatter	Increase this property to reduce erratic changes to edges from one frame to the next. Max of 100% for More Detailed, max of 400% for Smoother (Slower).
More Motion Blur	Check this option to render the matte with motion blur. The high-quality option is slower, but generates a cleaner edge. You can also control the number of samples and the shutter angle, which have the same meaning as they do in the context of motion blur in the composition settings. In Refine Soft Matte effect, any motion blur that's in the source image is already retained, you only need this option if you want more than what is in the footage.
Decontaminate Edge Colors	Check this option to decontaminate (clean) the color of edge pixels. The background color is removed from foreground pixels, which helps to fix halos and the contamination of motion-blurred foreground objects with background color. The strength of this cleaning is determined by Decontamination Amount.
Decontaminate Amount	Determines the strength of decontamination.
Extend Where Smoothed	Only functional when Reduce Chatter is greater than 0 and Decontaminate Edge Colors is selected. Edges that are moved in order to reduce chatter are cleaned.
Increase Decontamination Radius	Amount (in pixels) by which to increase the radius value for the cleaning of edge colors, in addition to any cleaning that covers feather, motion blur, and extended decontamination.
View Decontamination Map	Shows which pixels will be cleaned by decontamination of edge colors (white pixels in the map).

Chapter 12: Markers

Layer markers and composition markers

Use composition markers and layer markers to store comments and other metadata and mark important times in a composition or layer. Composition markers appear in the time ruler for the composition, whereas layer markers each appear on the duration bar of a specific layer. Both kinds of markers can hold the same information.

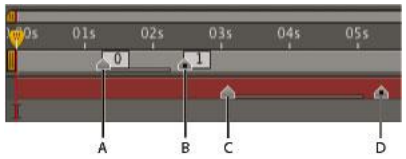
Markers can refer to a single point in time or to a duration.

Composition markers in After Effects correspond to sequence markers in Adobe Premiere Pro. Layer markers in After Effects correspond to clip markers in Adobe Premiere Pro.

When you render a composition that contains markers, the markers can be converted to web links, chapter links (chapter points), or cue points, depending on the output format and values that you set in the marker dialog box. Markers can also be exported as XMP metadata. (See XMP metadata.)

The default comment for a composition marker is a number, whereas the default comment for a layer marker is nothing.

A marker that contains link or cue point data has a small dot in its icon.



***A** composition marker with duration of 1 second **B** composition marker with cue-point data **C** layer marker with duration of 2 seconds **D** layer marker with cue-point data*

Markers make it easier to align layers or the current-time indicator with specific points in time: When you drag a keyframe, the current-time indicator, or a layer duration bar in the Timeline panel, hold down Shift to snap these items to markers.

You can add markers during a preview or audio-only preview, which allows you to place markers at significant points in the audio track of a layer.

Dragging a marker in point changes the marker's time and dragging a marker out point changes the marker's duration. You cannot simultaneously change the marker time and duration.

- To view or edit a data for a marker, double-click the marker, or right-click (Windows) or Control-click (Mac OS) the marker and choose Settings.
- To move a marker to a different time, drag the marker or double-click it and enter a time in the dialog box.
- To set the duration of a composition or layer marker, drag the marker's out point in the Timeline panel. Marker icons split by half to clearly indicate the marker in point and out point.

- To set a marker's duration by dragging, hold the Option (macOS) or Alt (Windows) key, then click the marker icon and drag to the right.
- To change the duration of a marker, click and drag the marker out point icon; you do not need to hold Option/Alt.
- To automatically create layer markers for a layer based on the temporal metadata in the layer's source file, select the Create Layer Markers From Footage XMP Metadata preference in the Media & Disk Cache preferences category. This preference is on by default.
- To synchronize layer markers on a precomposition layer to corresponding composition markers for the source composition, right-click (Windows) or Control-click (Mac OS) a layer marker and choose Update Markers From Source. This command also removes any markers that you have added to the layer.

Note:

If the layer uses a file (rather than a composition) as its source, this command restores the layer markers to those representing the temporal XMP metadata for the source file.

If you add one composition to another, the original composition becomes nested as a layer in the containing composition. All of the composition markers from the nested composition become layer markers in the timeline of the containing composition. These markers are not linked to the original composition markers. Changes that you make to the composition markers in the original composition do not affect layer markers in the nested composition. For example, if you remove one of the original composition markers, the corresponding layer marker for the nested composition remains in place.

Scripts and expressions can read and use data stored in markers. Because XMP metadata for source footage items can be converted to layer markers, expressions and scripts can work with XMP metadata.

Create composition markers

Composition markers appear as small triangles in the time ruler in the Timeline panel. You can have any number of composition markers in a composition.

If you remove a numbered composition marker, the other markers remain numbered as they were. If you change the comment from the default number, that number may be reused by a composition marker created later.

There can be at most one composition marker beginning at each time. If you add or move a composition marker to start at the same point in time as another composition marker, the added or moved marker replaces the other marker.

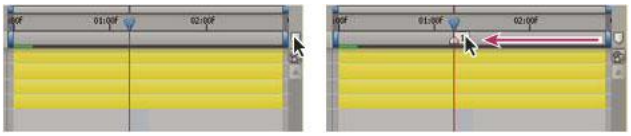
For alternative keyboard shortcuts, see Markers.

- To add a blank composition marker at the current time, make sure that no layer is selected, and choose Layer > Add Marker or press * (multiply) on the numeric keypad.

Note:

*Pressing * during a preview or audio-only preview adds a marker at the current time without interrupting the preview.*

- To add a composition marker at the current time and open the marker dialog box, make sure that no layer is selected, and press Alt+* (Windows) or Option+* (Mac OS) on the numeric keypad.
- To add a composition marker from the bin, drag the marker from the Comp Marker Bin button.



Dragging a composition marker from the bin.

- To add a numbered composition marker at the current time, press Shift + a number key (0–9) on the main keyboard.

Note:

If the number you press is already used by another composition marker, After Effects does not create a new marker. Instead, it moves the existing marker with that number to the new position.

- To remove a composition marker, drag the marker to the Comp Marker Bin button or Ctrl-click (Windows) or Command-click (Mac OS) the marker.
- To lock all composition markers on a composition, right-click (Windows) or Control-click (Mac OS) a marker on the composition, and choose Lock Markers.

Apply layer markers

Layer markers appear as small triangles on the duration bar of a layer. You can have any number of layer markers on a layer.

Layer markers are retained when you render and export a movie to a QuickTime container.

For alternative keyboard shortcuts, see Markers.

- To add a layer marker to selected layers at the current time, choose Layer > Add Marker or press * (multiply) on the numeric keypad.

Note:

*Pressing * during a preview or audio-only preview adds a marker at the current time without interrupting the preview.*

- To add a layer marker at the current time and open the marker dialog box, press Alt+* (Windows) or Option+* (Mac OS) on the numeric keypad.
- To remove a layer marker, Ctrl-click (Windows) or Command-click (Mac OS) the marker.
- To remove all layer markers from selected layers, right-click (Windows) or Control-click (Mac OS) a marker, and choose Delete All Markers.
- To lock all layer markers on a layer, right-click (Windows) or Control-click (Mac OS) a marker on the layer, and choose Lock Markers.
- To replace all layer markers with markers containing temporal metadata from the source file for the layer, right-click (Windows) or Control-click (Mac OS) a layer marker and choose Update Markers From Source.

Note:

In After Effects CS6 or later, adding a layer marker no longer deselects other objects (masks, and effects, for example).

Assign color labels to markers

You can assign color labels to Composition and Layer markers. By default, markers have no color. To change the color label of a marker, follow these steps:

1 Click and open the Marker settings dilaog.

2 Change the **New Label** property. To define color labels, select **Preferences** > **Labels**.

Scripts and utilities for working with markers

Paul Tuersley provides a script on the AE Enhancers forum for splitting layers at layer markers.

Lloyd Alvarez provides scripts on the After Effects Scripts website that do the following:

- Magnum, the Edit Detector automatically detects edits in a footage layer and places a layer marker at each edit (or splits the layer into a separate layer for each edit).
- Zorro, the Layer Tagger allows you to tag layers and then select, shy, and solo layers according to their tags. The tags are appended to comments in the Comments column in the Timeline panel and can also be added as layer markers.
- Layer Marker Batch Editor edits marker attributes on all selected layers, including Flash cue point attributes.

Jeff Almasol provides scripts on his redefinery website that do the following:

- rd_CopyMarkers copies layer markers from one layer to any number of other layers.
- rd_KeyMarkers creates new layer markers (either on the selected layer or on a new null layer) with comments that provide information about keyframes at the same times.
- rd_MapTextFileToMarkers sets keyframes for the Source Text property of a text layer and sets the values to text from a text file. The keyframes are placed at times specified by layer markers on the text layer.
- rd_MarkerNavigator creates a panel that makes navigating to markers and viewing their comments and other values very convenient.
- rd_RemoveMarkers automatically removes markers from selected layers based on specified criteria (e.g., all markers in work area).
- rd_Scooter creates a panel with controls for moving various combinations of items in time, including layer In point, layer Out point, layer source frames, keyframes, and markers.
- rd_CountMarkers shows the number of markers on the selected layer.

Online resources about markers

To view video tutorials on working with markers, cue points, and XMP metadata go to the Adobe website:

- Converting metadata and markers to cue points: video tutorial demonstrating using Soundbooth, Flash Professional, and After Effects to create and use cue points.
- Using markers and cue points: video overview of markers in Premiere Pro and After Effects.

XMP metadata

About XMP metadata

Metadata is—in the simplest sense—data about data. In practical terms, metadata is a set of standardized information about a file, such as author name, resolution, color space, copyright, and keywords applied to the file. For example, most cameras attach some basic information to video files, such as date, duration, and file type. Other metadata can be entered as shot-list information in OnLocation or at the capture stage in Adobe Premiere Pro. You can add additional metadata with properties such as location, author name, and copyright. Because you can share, view, and use this metadata across Adobe Creative Suite applications, you can use this information to streamline your workflow and organize your files.

The *Extensible Metadata Platform* (*XMP*) is the metadata standard used by Adobe applications. Metadata that is stored in other formats—such as Exif, IPTC (IIM), GPS, and TIFF—is synchronized and described with XMP so that it can be more easily viewed and managed. For example, adjustments made to images with Adobe Camera Raw are stored as XMP metadata. The XMP standard is based on XML.

A metadata *schema* is a collection of properties specific to a given workflow. The Dynamic Media schema, for example, includes properties such as Scene and Shot Location that are tailored for digital video projects. Exif schemas, by contrast, include properties tailored to digital photography, such as Exposure Time and Aperture Value. More general properties, such as Date and Title, appear in the Dublin Core schema. To see a tool tip with information about a specific schema or property, place the pointer over it in the Metadata panel. You can create your own schemas using commands in the Metadata panel, and you can import schemas and share them with others as XML files.

Metadata is divided into two general categories: *static metadata* and *temporal metadata*. Static metadata is metadata that applies to an entire asset. For example, the copyright and author information for a video clip apply to the entire clip. Temporal metadata is metadata that is associated with a specific time within a dynamic media asset. Beat markers from Soundbooth and the metadata generated by the Speech Search feature in Soundbooth and Premiere Pro are examples of temporal metadata.

Adobe Story also converts information from a screenplay (script) into XMP metadata that can automate the creation of shooting scripts, shot lists, and more.

Note:

To start the Adobe Story service from within After Effects, choose File > Go To Adobe Story.

You can view static XMP metadata for a file in Adobe Bridge.

After Effects scripts and expressions can read and use data stored in markers. Because XMP metadata for source footage items can be converted to layer markers, expressions and scripts can work with XMP metadata. Scripts can also operate on the XMP metadata for a file outside of the After Effects context, both for the automation of common tasks and for creative uses.

XMP metadata included in an F4V or FLV file can be read and used by ActionScript, so you can use XMP metadata to add interactivity to a video playing in Flash Player. One application of this feature is searching within an FLV file for temporal metadata, which can allow the user to begin playback at a specific word of dialog or at some other time associated with a specific temporal metadata element.

To selectively add and remove (thin) XMP metadata for a file, use export templates and the Metadata Export dialog box in Adobe Media Encoder.

Embedding XMP metadata versus including XMP metadata in sidecar files

In most cases, XMP metadata for a file is stored in the file itself. If it isn't possible to write the information directly into the file, XMP metadata is stored in a separate file called a *sidecar file*, with the filename extension .xmp. For information on which file formats After Effects can write XMP metadata directly into, see XMP metadata in After Effects.

In most cases, XMP metadata remains with the file even when the file is converted to a different format—for example, from PSD to JPG. XMP metadata is also retained when files are placed in a document or project in an Adobe Creative Suite application.

Online resources about XMP metadata

Go to the XMP Developer Center section of the Adobe website for the XMP specification, information on integrating XMP metadata with your software and workflow, the XMP SDK (software development kit), and forums about XMP metadata.

XMP metadata in After Effects

For an introduction to XMP metadata, see About XMP metadata.

When After Effects imports a file with associated XMP metadata, you can view the static metadata in the Metadata panel, convert the temporal metadata to layer markers, use the metadata to facilitate your work within After Effects, and include the metadata in output files.

The After Effects scripting interface provides additional tools for using and interacting with XMP metadata.

Importing files with XMP metadata into After Effects

After Effects can import XMP metadata from many formats, including the following:

- camera formats: AVCHD, HDV, P2, XDCAM, XDCAM EX
- image formats: GIF, JPEG, PNG, PostScript, TIFF
- common multimedia container formats: FLV, F4V, QuickTime (MOV), Video for Windows (AVI), Windows Media (ASF, WAV)
- authoring formats: InDesign documents, Photoshop documents (PSD), other native document formats for Adobe applications
- MPEG formats (MP3, MPEG-2, MPEG-4)
- SWF

When you import a file that contains XMP metadata, After Effects shows a "Reading XMP metadata from footage" status message while it reads the metadata from the source file.

One especially useful piece of metadata about each asset is its unique ID number, a value that distinguishes the asset from all others at all stages of the workflow. The unique ID value enables the application to recognize a file as being the same file as one encountered before, even if the filename has changed. One advantage of these unique ID values is that each application can use this information to manage cached previews and conformed audio files, preventing additional rendering and conforming.

The ID values used by XMP are *Globally Unique Identifiers* (*GUIDs*), 16-byte random numbers that are commonly used to ensure uniqueness of values.

XMP ID values are written to source files when they are imported into After Effects if the Write XMP IDs To Files On Import preference is selected in the Media & Cache preferences category. This preference setting affects other Adobe applications, too; see the helpful text in the Preferences dialog box for details. If a file already has an XMP ID, then After Effects doesn't write a new one, and no change is made. Files created by recent versions of Adobe applications will, in general, already have an XMP ID.

The Write XMP IDs To Files On Import preference is on by default.

Note:

The Write XMP IDs To Files On Import preference only controls whether unique ID values are automatically written to files when they are imported. This preference does not control whether XMP metadata is written to a file under other circumstances, such as when you edit metadata in the Metadata panel.

Note:

Because writing the ID to a file is considered a modification, the modification date of a source file may be updated the first time the file is imported.

Working with XMP metadata in After Effects

The Metadata panel

In After Effects, the Metadata panel (Window > Metadata) shows static metadata only. Project metadata is shown at the top of the panel, and Files metadata is shown at the bottom. Temporal metadata is visible in After Effects only as layer markers.

Project metadata is shown in the Metadata panel as soon as you open the panel. You can add and change information in any of the metadata categories. This information shows up in Bridge when the project file is selected and is also embedded in files rendered and exported using the render queue when the Include Source XMP Metadata output module option is selected.

To see Files metadata in the Metadata panel, you must first select a file in the Project panel. You can then add or change information in any of the metadata categories. If you select multiple files, then changes that you make will be made in all of the selected files. Any changes made to source file metadata are immediately written to the source files.

To change which metadata categories and fields are shown in the Metadata panel, choose Project Metadata Display Preferences or Files Metadata Display Preferences from the Metadata panel menu.

Conversion of XMP metadata to layer markers

When you create a layer based on a footage item that contains XMP metadata, the temporal metadata can be converted to layer markers.

? To enable the automatic conversion of XMP metadata to layer markers, select the Create Layer Markers From Footage XMP Metadata preference in the Media & Disk Cache preferences category.

During this conversion, After Effects shows a "Reading XMP markers from footage" status message.

These layer markers are fully editable, just as any other layer markers. (See Layer markers and composition markers.)

Changes made to the layer markers based on the source file's XMP metadata do not affect the XMP metadata in the source file.

To restore the layer markers for a layer to those read from the layer's source's XMP metadata, right-click (Windows) or Control-click (Mac OS) any marker on the layer and choose Update Markers From Source. This command also removes any markers that you have added to the layer. You can use this command to manually create layer markers from XMP metadata if you did not have the Create Layer Markers From Footage XMP Metadata preference selected when you created the layer.

For information on using expressions together with the contents of layer markers, see MarkerKey attributes (expression reference).

Exporting XMP metadata from After Effects

When you render and export a composition, you can write XMP metadata to the output file that includes all of the XMP metadata from the sources for that composition. This includes all of the composition markers and layer markers in the composition, all of the XMP metadata from the source files on which the layers in the composition are based, comments from the Comments columns in the Timeline panel and Project panel, and the project-level XMP metadata for the project in which the composition is contained. XMP metadata from nested compositions is recursively processed and included in the output.

To write all of the XMP metadata to the output file, select Include Source XMP Metadata in the output module settings for the output file. If Include Source XMP Metadata is deselected, the only XMP metadata that is written to the output file is a unique ID. (See Output modules and output module settings.)

Note:

When Include Source XMP Metadata is on, in some cases, rendering and exporting can take a long time because of the time that it takes to read and assemble XMP metadata from the source files. For this reason, the option is off by defa

In addition to storing XMP metadata in After Effects project (.aep, .aepx) files and source documents used by Adobe applications (for example, .psd), After Effects can write XMP metadata directly into the files for many container formats, including the following:

- QuickTime (.mov)
- Video for Windows (.avi)
- Windows Media (.wmv)

Note:

XMP metadata is written to sidecar (.xmp) files for some MPEG formats.

For files of other types, the Include Source XMP Metadata option is unavailable.

When you render and export a file and include the source XMP metadata in the output file, XMP metadata is written to an output file before the first frame of the composition is rendered. If the Render Details section of the Render Queue panel is open, After Effects shows a "Gathering XMP Metadata from Sources" status message while it compiles the metadata from the sources used in the composition being rendered.

XMP metadata that is written to a file is inserted in an XML data structure separate from the audio and video data itself. You can view this plain-text XML data just as you view any other plain-text data, and you can use and manipulate it with scripts of various kinds.

Note:

After Effects writes startTimecode and altTimecode values into XMP metadata. You can view these values in the Start Timecode and Alternate Timecode fields in the Dynamic Media schema in the Metadata panel.

Re-importing XMP metadata into After Effects

When you import a file into After Effects that has been rendered and exported from After Effects using the Include Source XMP Metadata option, all of the XMP metadata that was written to the output file is available as layer markers when the file is used as the source for a layer in a composition. This XMP metadata is not visible in the Metadata panel.

Note:

When you import a file that contains XMP metadata and use that file as the source for a layer, After Effects filters redundant XMP metadata. This prevents an accumulation of duplicate markers when you use a file in After Effects that was rendered and exported out of the same project—for example, when pre-rendering a piece of a project.

About file, clip, and project XMP metadata

For the most part, Adobe video and audio applications deal with XMP metadata very similarly. Some small distinctions exist, however, reflecting the unique workflow stage that each application addresses. When using applications in tandem, an understanding of these slightly different approaches can help you get the most out of metadata.

Adobe OnLocation and Encore provide one set of metadata properties for all assets. However, **Adobe Premiere Pro**, **After Effects**, and Soundbooth divide the Metadata panel into separate sections for different asset types.

Adobe Premiere Pro Separates metadata in these sections:

Clip Displays properties for clip instances you select in the Project panel or Timeline panel. This metadata is stored in project files, so it appears only in **Adobe Premiere Pro**.

File Displays properties for source files you select in the Project panel. This metadata is stored directly in the source files, so it appears in other applications, including Adobe Bridge.

After Effects Separates metadata in these sections:

Project Displays properties for the overall project. If you select Include Source XMP Metadata in the Output Module Settings dialog box, this information is embedded into files you output from the Render Queue.

Files Displays properties for source files you select in the Project panel. (If you select a proxy, properties for the actual file appear.)

For**After Effects**, both Project and File properties are stored directly in files, so you can access this metadata in Adobe Bridge.

File Displays properties for the currently displayed audio or ASND file. This metadata is stored directly in such files, so it appears in other applications. (Adobe Bridge, however, does not display metadata for ASND files.)

Clip Displays properties for multitrack clips you select in the Editor panel. This metadata is stored in the containing ASND file, so it appears only in Soundbooth.

Show or hide XMP metadata

To optimize the Metadata panel for your workflow, show or hide entire schemas or individual properties, displaying only those that you need.

1 From the options menu for the Metadata panel, select Metadata Display.

2 To show or hide schemas or properties, select or deselect them from the list.

Save, switch, or delete metadata sets

If you use multiple workflows, each requiring different sets of displayed metadata, you can save sets and switch between them.

1 From the options menu for the Metadata panel, select Metadata Display.

2 Do any of the following:

- To save a customized set of displayed metadata, click **Save Settings**. Then enter a name, and click OK.
- To display a previously saved set of metadata, select it from the menu.
- To delete a previously saved set of metadata, select it from the menu, and click Delete Settings.

Create schemas and properties

If you have a unique, customized workflow that the default metadata options don't address, create your own schemas and properties.

1 From the options menu for the Metadata panel, select Metadata Display.

2 Click New Schema, and enter a name.

3 In the list, click Add Property to the right of the schema name.

4 Enter a property name, and select one of the following for Type:

Integer Displays whole numbers that you drag or click to change.

Real Displays fractional numbers that you drag or click to change.

Text Displays a text box (for properties similar to Location).

Boolean Displays a check box (for On or Off properties).

Edit XMP metadata

In Adobe video applications, similarly named properties are linked in the Metadata and Project panels. However, the Metadata panel provides more extensive properties and lets you edit them for multiple files simultaneously.

Note:

Instead of a Project panel, Soundbooth uses the Files panel.

1 Select the desired files or clips.

2 In the Metadata panel, edit text or adjust values as needed.

If you selected multiple items, the panel displays properties as follows:

- If a property matches for all items, the matching entry appears.
- If a property differs, <*Multiple Values*> appears. To apply matching values, click the text box, and type.

Chapter 13: Memory, storage, performance

Improve performance

You can improve performance by optimizing your computer system, After Effects, your project, and your workflow. Some of the suggestions here improve performance not by increasing rendering speed but by decreasing time that other operations require, such as opening a project.

By far, the best way to improve performance overall is to plan ahead, run early tests of your workflow and output pipeline, and confirm that what you are delivering is what your client actually wants and expects. (See Planning your work.)

Improve performance before starting After Effects

- Make sure that you've installed the current version of After Effects, including any available updates. To check for and install updates, choose Help > Updates.
- Make sure that you've installed the latest versions of drivers and plug-ins, especially video card drivers. To download updates for drivers and plug-ins, go to the provider's website.
- Make sure that your system has enough RAM. Optimum performance is achieved with computer systems with at least 2 GB of installed RAM per processor core. See the documentation for your operating system and computer for details on how to check the amount of installed RAM and how to install RAM.
- Quit applications that are not necessary for your work. If you run applications other than those with which After Effects shares a memory pool, and you don't allocate adequate memory to other applications, performance can be greatly reduced when the operating system swaps RAM to the hard disk.
- Stop or pause resource-intensive operations in other applications, such as video previews in Adobe Bridge.
- Make sure that your system includes a display card that supports OpenGL 2.0 or later. Though After Effects can function without it, OpenGL accelerates various types of rendering, including rendering to the screen for previews. See Render with OpenGL.
- When possible, keep the source footage files for your project on a fast local disk drive. If your source footage files are on a slow disk drive (or across a slow network connection), then performance will be poor. Ideally, use separate fast local disk drives for source footage files and rendered output.
- A separate fast disk (or disk array) to assign the disk cache folder to, is ideal. Because of their speed, SSDs work well for this function.

Improve performance by optimizing memory cache settings

- Allocate adequate memory for other applications.
- Enable caching frames to disk for previews by selecting the Enable Disk Cache preference. In After Effects, assign as much space as possible to the Disk Cache folder (on a separate fast drive) for best performance.

See Memory preferences for additional information.

Improve performance using Global Performance Cache | CC, CS6

Import projects from After Effects CS5.5 and earlier into After Effects to take advantage of the Global Performance Cache.

The global performance cache improves performance by retaining frames stored in the disk cache between sessions, saving rendering time as you work on a project or other projects that might use the same cached frames.

Improve performance by simplifying your project

By simplifying and dividing your project, you can prevent After Effects from using memory and other resources to process elements that you are not currently working with. Also, by controlling when After Effects performs certain processing, you can greatly improve overall performance. For example, you can avoid repeating an action that needs to happen only once, or you can postpone an action until it is more convenient for you.

- Delete unused elements from your project. See Remove items from a project.
- Divide complex projects into simpler projects, and then recombine them before you render the finished movie. To recombine projects, import all of the projects into a single project. See Import an After Effects project.
- Before rendering, put all of your source footage files on a fast, local disk—not the one that you're rendering and exporting to. A good way to do this is with the Collect Files command. See Collect files in one location.
- Pre-render nested compositions. Render a completed composition as a movie so that After Effects doesn't rerender the composition every time it is displayed. See Pre-render a nested composition.
- Substitute a low-resolution or still-image proxy for a source item when not working directly with that item. See Placeholders and proxies.
- Lower the resolution for the composition. See Resolution.
- Isolate the layer you're working on by using the Solo switch. See Solo a layer.

Improve performance by modifying screen output

You can improve performance in many ways that don't affect how After Effects treats your project data, only how output is drawn to the screen as you work. Although it is often useful to see certain items and information as you work, After Effects uses memory and processor resources to update this information, so be selective in what you choose to display as you work. You will likely need to see different aspects of your project at different points in your workflow, so you may apply the following suggestions in various combinations at various stages.

- Turn off display color management and output simulation when not needed. See Simulate how colors will appear on a different output device. The speed and quality of color management for previews are controlled by the Viewer Quality preferences. See Viewer Quality preferences.
- Enable hardware acceleration of previews, which uses the GPU to assist in drawing previews to the screen. Choose Edit > Preferences > Display (Windows) or After Effects > Preferences > Display (Mac OS), and select Hardware Accelerate Composition, Layer, And Footage Panels.
- Close unneeded panels. After Effects must use memory and processor resources to update open panels, which may slow the work that you are doing in another panel.
- Create a region of interest. If you are working on a small part of your composition, limit which portion of the composition is rendered to the screen during previews. See Region of interest (ROI).
- Deselect Show Cache Indicators in the Timeline panel menu to prevent After Effects from displaying green and blue bars in the time ruler to indicate cached frames.

- Deselect the Show Rendering Progress In Info Panel And Flowchart preference to prevent the details of each render operation for each frame from being written to the screen. See Display preferences.
- Hide Current Render Details in the Render Queue panel by clicking the triangle beside Current Render Details in the Render Queue panel. See Basics of rendering and exporting.
- Press Caps Lock to prevent After Effects from updating Footage, Layer, or Composition panels. When you make a change that would otherwise appear in a panel, After Effects adds a red bar with a text reminder at the bottom of the panel. After Effects continues to update panel controls such as motion paths, anchor points, and mask outlines as you move them. To resume panel updates and display all changes, press Caps Lock again.

Note:

Pressing Caps Lock suspends updates (disables refresh) of previews in viewers during rendering for final output, too, although no red reminder bar appears.

- Lower the display quality of a layer to Draft. See Layer image quality and subpixel positioning.
- Select Draft 3D in the Timeline panel menu, which disables all lights and shadows that fall on 3D layers. It also disables the depth-of-field blur for a camera.
- Use fast draft mode while laying out and previewing a ray-traced 3D composition by selecting an option other than "Off" from the Fast Previews button.
- Deselect Live Update in the Timeline panel menu to prevent After Effects from updating compositions dynamically. See Preview modes and Fast Previews preferences.
- Display audio waveforms in the Timeline panel only when necessary. See Showing properties and groups in the Timeline panel.
- Disable pixel aspect ratio correction by clicking the Toggle Pixel Aspect Ratio Correction button at the bottom of a Composition, Layer, or Footage panel. The speed and quality of pixel aspect ratio correction and other scaling for previews are controlled by the Viewer Quality preferences. See Viewer Quality preferences.
- Deselect Mirror On Computer Monitor when previewing video on an external video monitor. See Preview on an external video monitor.
- Hide layer controls, such as masks, 3D reference axes, and layer handles. See Show or hide layer controls in the Composition panel.
- Lower the magnification for a composition. When After Effects displays the Composition, Layer, and Footage panels at magnifications greater than 100%, screen redraw speed decreases. (See Zoom an image for preview.)
- Set the Resolution/Down Sample Factor value of the composition to Auto in the Composition panel, which prevents the unnecessary rendering of rows or columns of pixels that aren't drawn to the screen at low zoom levels. See Resolution.

Improve performance when using effects

Some effects, such as blurs and distortions, require large amounts of memory and processor resources. By being selective about when and how you apply these effects, you can greatly improve overall performance.

- Apply memory-intensive and processor-intensive effects later. Animate your layers and do other work that requires real-time previews before you apply memory-intensive or processor-intensive effects (such as glows and blurs), which may make previews slower than real time.
- Temporarily turn off effects to increase the speed of previews. See .
- Limit the number of particles generated by particle effects. See .

- Rather than apply the same effect with the same settings to multiple layers, apply the effect to an adjustment layer. When an effect is applied to an adjustment layer, it is processed once, on the composite of all of the layers beneath it. See Adjustment layers.

Memory and storage

Memory (RAM) usage in 64-bit After Effects

Memory preferences

Set memory preferences by choosing **Edit** > **Preferences** > **Memory** (Windows) or **After Effects** > **Preferences** > **Memory** (Mac OS).

As you modify settings in the Memory dialog box, After Effects dynamically updates helpful text in the dialog box that reports how it will allocate and use memory and CPUs.

The RAM Reserved For Other Applications preference is relevant whether or not Render Multiple Frames Simultaneously is selected.

RAM Reserved For Other Applications Increase this value to leave more RAM available for the operating system and for applications other than After Effects and the application with which it shares a memory pool. If you know that you will be using a specific application along with After Effects, check its system requirements and set this value to at least the minimum amount of RAM required for that application. Because performance is best when adequate memory is left for the operating system, you can't set this value below a minimum baseline value.

Memory pool shared between After Effects, Premiere Pro, Prelude, Media Encoder, Photoshop, and Audition

After Effects shares a memory pool with Adobe CC applications. This is indicated in the Memory preferences panel by the icons for each of these applications at the top of the panel. The icons are dimmed for the applications that are not running.

A memory balancer prevents swapping of RAM to disk by dynamically managing the memory allocated to each of the applications. Each application registers with the memory balancer with some basic information: minimum memory requirements, maximum memory able to be used, current memory in use, and a priority. The priority has three settings: low, normal, and highest. Highest is currently reserved for After Effects and Premiere Pro, when it is the active application. Normal is for After Effects in the background or Adobe Media Encoder in the foreground. Low is for background servers of Premiere Pro or Adobe Media Encoder in the background.

Note:

An example of a practical result of the shared memory pool is that starting Premiere Pro will decrease the amount of RAM available to After Effects for previews; quitting Premiere Pro will immediately free RAM for After Effects and extend the possible duration of previews.

Memory dialog box

The Memory Details dialog box contains additional information about installed RAM and current and allowed RAM usage. It also includes a multicolumn table listing processes related to the applications. The table includes information about each process, such as ID, Application Name, Minimum Needed Memory, Maximum Usable Memory, Maximum Allowed Memory, Current Memory, and Current Priority.

To open the dialog box, choose **Edit** > **Preferences** > **Memory** (Windows) or **After Effects** > **Preferences** > **Memory** (Mac OS), and click the Details button at the bottom of the preferences dialog box.

You can copy the information to the clipboard with the **Copy** button.

Memory (RAM) requirements for rendering

Memory requirements for rendering of a frame (either for previews or for final output) increase with the memory requirement of the most memory-intensive layer in the composition.

After Effects renders each frame of a composition one layer at a time. For this reason, the memory requirement of each individual layer is more relevant than the duration of the composition or the number of layers in the composition when determining whether a given frame can be rendered with the available memory. The memory requirement for a composition is equivalent to the memory requirement for the most memory-intensive single layer in the composition.

The memory requirements of a layer increase under several circumstances, including the following:

- Increasing the project's color bit depth
- Increasing the composition resolution
- Using a larger source image
- Enabling color management
- Adding a mask
- Adding per-character 3D properties
- Precomposing without collapsing transformations
- Using certain blending modes, layer styles, or effects, especially those involving multiple layers
- Applying certain output options, such as 3:2 pulldown, cropping, and resizing
- Adding shadows or depth-of-field effects when using 3D layers

After Effects requires a contiguous block of memory to store each frame; it cannot store a frame in pieces in fragmented memory. For information about how much RAM is required to store an uncompressed frame, see Storage requirements for output files.

Note:

For tips on decreasing memory requirements and increasing performance, see Improve performance by simplifying your project.

Purging memory (RAM)

Occasionally, After Effects may display an alert message indicating that it requires more memory to display or render a composition. If you receive an out-of-memory alert, free memory or reduce the memory requirements of the most memory-intensive layers, and then try again.

You can free memory immediately with commands from the Edit > Purge menu:

- All Memory
- Image Cache Memory

- All Memory & Disk Cache
- Undo
- Snapshot

Purging memory is faster for large projects. Purging memory do not synchronize the project database; If you want force synchronization of the project database, press the Option (Mac OS) or Alt (Windows) key and choose Edit >Purge > All Memory. You can do this if you see that the Composition panel fails to update correctly and the Purge> All Memory or All Memory & Disk Cache commands do not help.

Troubleshooting memory issues

Error: "Unable to allocate enough memory to render the current frame...."

Either decrease the memory requirements for the rendering of this frame, or install more RAM.

Error: "Unable to allocate [n] MB of memory...."

Either decrease the memory requirements for the rendering of this frame, or install more RAM.

Error: "Image buffers of size [width]x[height] @ [depth] bpc ([n] GB) exceed internal limits..."

Decrease the memory requirements for the rendering of this frame.

Note:

The maximum amount of memory that one frame can occupy is 2 GB.

Error: "Memory allocation of [n] GB exceeds internal limits..."

Decrease the memory requirements for the rendering of this frame.

Note:

The maximum size for any single memory allocation is 2 GB.

Storage requirements for output files

Use the following formula to determine the number of megabytes required to store one uncompressed frame at full resolution:

(*height in pixels*) x (*width in pixels*) x (*number of bits per channel*) / 2,097,152

Note:

The value 2,097,152 is a conversion factor that accounts for the number of bytes per megabyte (2^{20}), the number of bits per byte (8), and the number of channels per pixel (4).

Some example frame sizes and memory requirements, in megabytes (MB) per frame:

- DV NTSC (720x480) frame in an 8-bpc project: 1.3 MB
- D1/DV PAL (720x576) frame in an 8-bpc project: 1.6 MB
- HDTV (1920x1080) frame in a 16-bpc project: 16 MB
- 4K digital cinema (4096x2304) frame in a 32-bpc project: 144 MB

Because video is typically compressed during encoding when you render to final output, you can't just multiply the amount of memory required for a single frame by the frame rate and composition duration to determine the amount of disk space required to store your final output movie. However, such a calculation can give you a rough idea of the maximum storage space you may need. For example, one second (approximately 30 frames) of uncompressed standard-definition 8-bpc video requires approximately 40 MB. A feature-length movie at that data rate would require more than 200 GB to store. Even with DV compression, which reduces file size to 3.6 MB per second of video, this storage requirement translates to more than 20 GB for a typical feature-length movie.

It is not unusual for a feature-film project—with its higher color bit depth, greater frame size, and much lower compression ratios—to require terabytes of storage for footage and rendered output movies.

Caches: RAM cache, disk cache, and media cache

As you work on a composition, After Effects temporarily stores some rendered frames and source images in RAM, so that previewing and editing can occur more quickly. After Effects does not cache frames that require little time to render. Frames remain uncompressed in the image cache.

After Effects also caches at the footage and layer levels for faster previews; layers that have been modified are rendered during the preview, and unmodified layers are composited from the cache.

When the RAM cache is full, any new frame added to the RAM cache replaces a frame cached earlier. When After Effects renders frames for previews, it stops adding frames to the image cache when the cache is full and begins playing only the frames that could fit in the RAM cache.

Green bars in the time ruler of the Timeline, Layer and Footage panels mark frames that are cached to RAM. Blue bars in the Timeline panel mark frames that are cached to disk.

Layer Cache Indicators Layer cache indicators allow you to visualize cached frames on a per-layer basis. This is helpful when trying to determine which layers are cached in a composition.

Enable the Layer Cache Indicators option by pressing Ctrl (Windows) or Command (Mac), and then choose Show Cache Indicators in the Timeline panel menu. The Show Cache Indicators option must be enabled in the menu to see the indicators.

Showing the cache indicators decreases performance slightly.

The RAM cache is automatically purged when you quit After Effects.

You can choose to purge the RAM cache, or the RAM cache and the disk cache from the **Edit** > **Purge** menu.

Choose Edit > Purge > All Memory & Disk Cache to purge the contents of all RAM caches (like the existing All Memory command) and the contents of the disk cache (like the existing Empty Disk Cache button in the Media & Disk Cache preferences).

After Effects purges memory faster for large projects. Purging memory do not synchronize the project database. If you want force synchronization of the project database, press the Option (Mac OS) or Alt (Windows) key and choose Edit >Purge > All Memory. You can do this if you see that the Composition panel fails to update correctly and the Purge> All Memory or All Memory & Disk Cache commands do not help.

Note:

Purging the disk cache for one version of After Effects doesn't purge the cache for other versions. For example, purging the disk cache from After Effects CC won't affect the disk cache for After Effects CS6.

The global performance cache

The global performance cache consists of the following:

Global RAM cache: When you modify a composition, frames in the RAM cache are not automatically erased and are reused if you undo the change or restore the previous state of the composition. The oldest frames in the RAM cache are erased when the RAM cache is full and After Effects needs to cache new frames.**Persistent disk cache**: Frames cached to disk are still available, even after closing After Effects.

For more information about the global performance cache, see the blog post entitled, "GPU (CUDA, OpenGL) features in After Effects" on the After Effects Team blog.

Video: Global performance cache

Video: Global performance cache

Note:

The disk cache is not used for previews. It is only used for previews without real time playback of cached frames and audio. (See Previewing.)

Disk Cache is enabled by default. For disk cache preferences, and to enable, or disable disk caching:

? Choose **Edit** > **Preferences** > **Media & Disk Cache** (Windows) or **After Effects** > **Preferences** > **Media & Disk Cache** (Mac OS), and select, or deselect Enable Disk Cache.

Disk cache preferences allow you to select a folder to contain your cache.

? Click the Choose Folder button, and then click OK (Windows) or Choose (Mac OS).

To empty the disk cache:

? Click the Empty Disk Cache button or select the Purge All Memory and Disk Cache option from the Edit menu.

Note:

Even when disk caching is enabled, each frame must be able to fit into a contiguous block of RAM. Enabling the disk cache doesn't help with limitations regarding inadequate RAM to hold or render a single frame of your composition.

For best performance with disk caching, select a folder on a different physical hard disk than your source footage. It is best if the folder is on a hard disk that uses a different drive controller than the disk that contains your source footage. A fast hard drive or SSD with as much space allocated as possible is recommended for the disk cache folder. The disk cache folder can't be the root folder of the hard disk.

As with the RAM cache, After Effects only uses the disk cache to store a frame if it's faster to retrieve a frame from the cache than to rerender the frame.

The Maximum Disk Cache Size setting specifies the number of gigabytes of hard disk space to use. The default disk cache size is set to 10% of the volume's total size, up to 100 GB.

Note:

*The application checks to make sure that you have 10 GB free above what is set in **Preferences** > **Media & Disk Cache**. After Effects warns you if there is not enough room for the disk cache.*

Global RAM cache

Global RAM cache offers these advantages:

- Cached frames are restored after an undo/redo.

- Cached frames are restored when a composition or layer is returned to a previous state, such as turning a layer's visibility off then back on.
- Reusable frames are recognized anywhere on the timeline (e.g., when using loop expressions, time remapping, or copy/paste of keyframes), not just adjacent frames.
- Reusable frames are recognized on duplicated layers or duplicated compositions;
- Cache is not automatically destroyed by a render queue rendering using anything other than Current Settings.

In this video by Learn by Video you'll see how the RAM and disk caches are used to save time, and how you can render compositions in the background so that you don't need to wait for a preview to be rendered before you can resume work.

Persistent disk cache

Once you save a project, frames in the disk cache are retained even after you close the project or quit After Effects. This protocol is called persistent disk cache.*The disk cache is no longer emptied at the end of a session. With the persistent disk cache feature, frames stored in the disk cache is retained between sessions. This saves rendering time as you work on a project or other projects that use the same cached frames.*

Upon opening a project, the disk cache is scanned looking for frames matching those in the project, and makes them available for use. The disk cache contains frames from all projects you've opened in the same or earlier sessions, so disk-cached frames from one project will be retrieved for reuse in other projects that need those same frames. As the cache is scanned, blue marks gradually fill in on your timeline.

Because previous versions of After Effects didn't store everything on disk needed for this feature, resave CS5.5 and earlier projects, to experience persistent caching.

Note:

Roto Brush frames are not persistently cached.

Note:

Cache Work Area in background also uses the disk cache to store frames. See Improve performance using Global Performance Cache | CC, CS6.

Video tutorial: How to Optimize After Effects for High Performance

Video tutorial: How to Optimize After Effects for High Performance

Cache work area in background

You can fill the disk cache for a composition's work area (or multiple work areas in the same or multiple compositions) while continuing to work. When you do not expect to make changes to a composition, especially if it is used in downstream compositions, you can render the frames to the disk cache in the background. Normally, the application tries to identify appropriate expensive-to-render frames that should be placed in the disk cache, but this command will force those frames to be rendered to the disk cache for quicker retrieval next time they are needed.

1 To cache to a composition to disk in the background:

Make sure that disk caching is enabled in **Edit** > **Preferences** > **Media & Disk Cache** (Windows) or **Premiere Pro** > **Preferences** > **Media & Disk Cache** (MacOS).

Note:

For best results, use a large disk cache on a fast drive that is different from the source footage drive. SSD drives work well for disk caching.

2 Set the work area for the frames to cache to disk.

3 Choose **Composition** > **Cache Work Area in Background**, or use the keyboard shortcut Ctrl + Enter (Windows) or Cmd + Enter (MacOS).

To cancel cache work area in background, choose **Composition** > **Cancel Cache Work Area in Background**.

The project is saved to a temporary file on disk, and then a background instance of After Effects is launched to render it. Rendering progress appears in the Info panel. Rendered frames appear as blue cache marks because they are in the disk cache. Layer caches and nested compositions will only get disk cached if worthwhile (expensive enough to render).

You can queue different sections of the same composition or different compositions or from even a different project, but only one work area is being rendered at a time in the background.

Note:

If you make a change to a queued work area, the existing render continues to use its previous settings. Blue cache indicators will not reappear until you undo back to that state.

To cache multiple compositions in the background:

1 Set the work area in each composition you want to cache.

2 Select the compositions in the Project panel.

3 Do one of the following:

- Choose **Composition** > **Cache Work Area in Background**
- Press Ctrl+Enter (Windows) or Cmd+Enter (MacOS)
- Choose Cache Work Area in Background from the contextual menu

To cancel the current and all pending background cache renders:

? Choose **Composition** > **Cancel Caching Work Area in Background**.

If multiple background jobs are running, the number of jobs will appear as part of the menu command.

Media cache

When After Effects imports video and audio in some formats, it processes and caches versions of these items that it can readily access when generating previews. Imported audio files are each conformed to a new .cfa file, and MPEG files are indexed to a new .mpgindex file. The media cache greatly improves performance for previews, because the video and audio items are not reprocessed for each preview.

Note:

When you first import a file, you may experience a delay while the media is being processed and cached.

A database retains links to each of the cached media files. This media cache database is shared with Adobe Media Encoder, Premiere Pro, Encore, Soundbooth, so each of these applications can each read from and write to the same set of cached media files. If you change the location of the database from within any of these applications, the location is updated for the other applications, too. Each application can use its own cache folder, but the same database keeps track of them all.

? Choose **Edit** > **Preferences** > **Media & Disk Cache** (Windows) or **After Effects** > **Preferences** > **Media & Disk Cache** (Mac OS), and do one of the following:

- Click one of the Choose Folder buttons to change the location of the media cache database or the media cache itself.
- Click Clean Database & Cache to remove conformed and indexed files from the cache and to remove their entries from the database. This command only removes files associated with footage items for which the source file is no longer available.

Note:

Before clicking the Clean Database & Cache button, make sure that any storage devices that contain your currently used source media are connected to your computer. If footage is determined to be missing because the storage device on which it is located is not connected, the associated files in the media cache will be removed. This removal results in the need to reconform or re-index the footage when you attempt to use the footage later.

Cleaning the database and cache with the Clean Database & Cache button does not remove files that are associated with footage items for which the source files are still available. To manually remove conformed files and index files, navigate to the media cache folder and delete the files. The location of the media cache folder is shown in the Conformed Media Cache preferences. If the path is truncated, click the Choose Folder button to show the path.

GPU and GPU driver requirements for After Effects

What GPU should be used for the best performance?

New GPU chipsets are always being introduced, and the After Effects team does not qualify or recommend individual GPU chipsets, however, here are some guidelines you can follow to get the best GPU for your workflow.

- Individual GPU technologies are less important than overall GPU performance. After Effects supports OpenGL, OpenCL, CUDA, and Metal to varying degrees. Choose a high-performance card that meets your individual budget and system needs.
- Premiere Pro utilizes the GPU more broadly than After Effects currently does, and its technology is shared with After Effects. The list of recommended GPUs for Premiere Pro (see Adobe Premiere Pro CC system requirements) is a good place to start.
- Other applications in your workflow may have a GPU requirement that is higher than After Effects. Take all of them into consideration.
- Check if you have Multiple GPUs in the same machine.
- Check if you have unsupported GPUs on your Mac machine.

GPU-related issues you may face

After upgrading to After Effects version 17.0, there may be driver issues, and you may need to upgrade your driver.

Some of the driver issues that you could face are:

- System incompatibilities that are known to cause instability and crashes that lead to data loss.
- The current version of your network device software may cause issues with your Adobe application
- Intermittent crash while editing.
- You can get error messages such as, "*This version of your operating system is incompatible with your Adobe application*."
- No previews, garbled previews, frame drops, performance issues including slow playback or frame glitches.

This article explains what is needed for using CUDA graphics with the 2019 versions of After Effects (17.0 and higher).

NVIDIA CUDA graphics acceleration requirements for MacOS and Windows

Note:

Adobe strongly recommends updating to NVIDIA driver 430.86 or later when using After Effects. Drivers prior to this have a known issue which can lead to a crash.

NVIDIA CUDA graphics acceleration requires CUDA 9.2 drivers.

CUDA is not a requirement for running the Adobe video apps, but if you prefer CUDA graphics acceleration, you must have CUDA 9.2 drivers from NVIDIA installed on your system before upgrading to After Effects versions 17.0 and later.

Updating NVIDIA Drivers on Windows

These drivers are updated regularly so check the NVIDA website to be sure you have the most current version for your GPU.

You can find the latest GPU drivers here:

- https://www.nvidia.com/Download/index.aspx?lang=en-us
- https://www.nvidia.com/object/mac-driver-archive.html

Updating display driver and CUDA 9.2 driver for MacOS

- Requires macOS 10.13.6 (most recent version of High Sierra).
- A current NVIDIA GPU with at least 4 GB of memory.
- NVIDIA display driver version 387.10.10.10.40.105.

Note:

The current version of your NVIDIA drivers for macOS 10.13.6 do not support CUDA 9.2 and cause issues with your Adobe application. Adobe does not recommend upgrading beyond macOS 10.13.6 as Mac0S 10.14 (Mojave) does not currently support CUDA.

Make sure you update the device driver before you install the CUDA driver. You can update the device driver from the following locations:

- Display driver: version 387.10.10.10.40.105 (direct download).

- CUDA driver: You can update the CUDA driver in the CUDA panel in System Preferences or follow this link - 130_macos (direct download).

After Effects features that use GPU

Features natively available in After Effects

There is a host of After Effects features that use GPU to accelerate rendering. To view these effects, select **Project Settings > Video and Effects Rendering**. For a list of GPU-accelerated effects and features, see GPU-accelerated effects.

Third-party effects

Some third-party effects, like Element 3D by Video Copilot uses the GPU independently of After Effects. Refer to the documentation from the publisher for guidance on what GPUs and technology are supported. Effects such as Magic Bullet Looks, hook into the Mercury GPU Acceleration pipeline (such effects are also GPU-accelerated in Premiere Pro).

Mercury GPU Acceleration

Mercury GPU Acceleration allows After Effects to render supported effects using the GPU, which can significantly improve render time.

You may recognize the **Mercury** name from Premiere Pro. After Effects uses the same technology that is used by Premiere Pro Mercury Playback Engine for rendering. (The playback engine in After Effects is otherwise different from Premiere Pro, so After Effects only uses the rendering component of that technology.)

Mercury GPU Acceleration is a project setting. To enable it, select **File > Project Settings**, click the **Video Rendering and Effects** tab, and set the **Use** option to **Mercury GPU Acceleration**. Depending on your computer and GPU, you may see multiple such options. After Effects supports the following GPU technologies:

- OpenCL (macOS and Windows)
- CUDA (Windows only, with a Nvidia GPU)
- Metal (macOS only, 10.12 and later)

Note:

NVIDIA CUDA is not supported in MacOS 10.14 and later. If you are using an Apple-authorized NVIDIA GPU, you can continue to use the Metal Mercury Playback Engine.

More information about GPU

A couple of technical points worth noting about the above list:

- All of the VR effects such as VR Blur only work on the GPU. Unlike the other effects, they do not currently have a CPU fallback. We recommend a GPU with high VRAM, 4GB or better, to use these effects. Their advantage for VR over other effects is that they are seamless, and they wrap the ends of the VR image together. Also, some of them are useful on non-VR footage because they are wholly new to After Effects, like VR Chromatic Aberrations.

- Layer transforms and layer quality require layer motion blur to be enabled because by themselves, they do not render significantly faster on the GPU. But rendering motion blur on the GPU requires it to be aware of the transforms and quality, so these calculations are done on the GPU when motion blur requires it. This is an opportunity to point out that in a mixed CPU and GPU rendering environment, there is a performance cost to moving frames between CPU and GPU memory. If an effect is not faster to render on the GPU than on the CPU, you lose performance time while copying the frames back and forth.
- The **Hardware Accelerate Composition, Layer, and Footage Panels** option in **Preferences > Previews** is enabled by default, and uses OpenGL to prepare the rendered frames for screen display during previews/playback. Once After Effects renders the frame, it next prepares that frame for display, taking into account the screen resolution, scaling, overlays like guides and layer handles, and color management. Specifically, **View > Use Display Color Management**, when a working space color profile has been enabled for the project. When the Hardware Accelerate option is disabled, After Effects processes all of that on the CPU, but the GPU can accelerate this process, especially color management. The GPU requirement for this is very low, and any modern video card with a small amount of VRAM is adequate.

Chapter 14: Rendering and exporting

Basics of rendering and exporting

Rendering and exporting overview

What is rendering?

Rendering is the creation of the frames of a movie from a composition. The rendering of a frame is the creation of a composited two-dimensional image from all the layers, settings, and other information in a composition that makes up the model for that image. The rendering of a movie is the frame-by-frame rendering of each of the frames that make up the movie. For more information on how each frame is rendered, see Render order and collapsing transformations.

It is common to speak of rendering as if this term only applies to final output. However, the processes of creating previews for the Footage, Layer, and Composition panels are also kinds of rendering. In fact, it is possible to save a preview as a movie and use that as your final output. (See Preview video and audio.)

After a composition is rendered for final output, it is processed by one or more output modules that encode the rendered frames into one or more output files. This process of encoding rendered frames into files for output is one kind of exporting.

Note:

- See Project settingsfor more information about project settings that determine how time is displayed in the project, how color data is treated in the project, and what sampling rate to use for audio.
- See Composition settingsto learn how you can specify composition settings such as resolution, frame size, and pixel aspect ratio for your final rendered output.

After Effects provides various rendering options that help you accelerate the rendering process. GPU acceleration offers better speed and precision in rendering your effects. The Video Rendering and Effects dropdown in the Project Settings dialog box gives you the following GPU effect rendering options to choose from:

- Software Only: CPU is used to render effects
- Mercury GPU Acceleration: GPU is used to render effects. On Mac, Mercury GPU Acceleration can use OpenCL or Metal. On Windows, GPU effect rendering uses either CUDA or OpenCL based on your selection.

Note: GPU-accelerated effects may render with small color precision differences in an 8-bpc project when compared to CPU-only rendering. Set the project to 16-bpc or 32-bpc for accurate results.

After you have completed a composition, you can output a movie file. There are two different methods of outputting a movie file. Choose the one based on your needs.

You might need a movie file for the following reasons:

- You need a high-quality movie (with or without an alpha channel) or image sequence that will be placed in a Premiere Pro sequence, or used in another video editing, compositing, or 3D graphics application.

  To create a high-quality movie file, render it with the Render Queue. See Render and export with the Render Queue panel

- You need a compressed movie that will be played on the web, or used for DVD or Blu-ray disc.

  To create a high-quality movie file that is compressed for the web, DVD, or Blu-ray disc, encode it using the Adobe Media Encoder. See Render and export with Adobe Media Encoder

Note:

Some kinds of exporting don't involve rendering and are for intermediate stages in a workflow, not for final output. For example, you can export a project as an Adobe Premiere Pro project by choosing File > Export > Adobe Premiere Pro Project. The project information is saved without rendering. In general, data transferred through Dynamic Link is not rendered.

A movie can be made into a single output file that contains all the rendered frames, or it can be made into a sequence of still images (as you would do when creating output for a film recorder).

To generate output, you can either render your compositions using the After Effects render queue or add your compositions to the Adobe Media Encoder queue with the render settings that you have chosen in the Render Queue panel.

For the Render Queue, After Effects uses an embedded version of the Adobe Media Encoder to encode most movie formats through the Render Queue panel. When you manage render and export operations with the Render Queue panel, the embedded version of the Adobe Media Encoder is called automatically. The Adobe Media Encoder appears only in the form of the export settings dialog boxes with which you specify some encoding and output settings. (See Encoding and compression options for movies.)

Note:

The embedded version of the Adobe Media Encoder used to manage export settings within After Effects output modules does not provide all the features of the full, stand-alone Adobe Media Encoder application.

From an expert: Using the Render Queue to export files

From an expert: Using the Render Queue to export files

Render and export with the Render Queue panel

The primary way of rendering and exporting movies from After Effects is through the Render Queue panel.

When you place a composition into the Render Queue panel, it becomes a render item. You can add many render items to the render queue, and After Effects can render multiple items in a batch, unattended. When you click the Render button in the upper-right corner of the Render Queue panel, all items with the status of Queued are rendered and output in the order in which they are listed in the Render Queue panel.

You do not need to render a movie multiple times to export it to multiple formats with the same render settings. You can export multiple versions of the same rendered movie by adding output modules to a render item in the Render Queue panel.

When working with multiple render items, it is often useful to add comments in the Comment column in the Render Queue panel. If the Comment column is not visible, right-click (Windows) or Control-click (Mac OS) a column heading, and choose Columns > Comment.

Manage render items

In the Render Queue panel, you can manage several render items at once, each with its own render settings and output module settings.

Render settings determine the following characteristics:

- Output frame rate
- Duration
- Resolution
- Layer quality

Output module settings—which are applied after render settings—determine post-rendering characteristics such as the following:

- Output format
- Compression options
- Cropping
- Whether to embed a link to the project in the output file

You can create templates that contain commonly used render settings and output module settings.

Using the Render Queue panel, you can render the same composition to different formats or with different settings, all with one click of the Render button:

- You can output to a sequence of still images, such as a Cineon sequence, which you can then transfer to film for cinema projection.
- You can output using lossless compression (or no compression) to a QuickTime container for transfer to a non-linear editing (NLE) system for video editing.

You can select, duplicate, and reorder render items using many of the same keyboard shortcuts that you use for working with layers and other items. See General.

Note:

To transfer the output rendered from After Effects to film or video, you must have the proper hardware for film or video transfer, or have access to a service bureau that can provide transfer services.

Render and export a movie using the render queue

1 Select the composition from which to make a movie in the Project panel, and then do one of the following to add the composition to the render queue:

   - Choose Composition > Add To Render Queue.
   - Drag the composition to the Render Queue panel.

   To create a composition from a footage item and immediately add that composition to the render queue, drag the footage item from the Project panel to the Render Queue panel. It is a convenient way to convert a footage item from one format to another.

2 Click the triangle next to the Output To heading in the Render Queue panel to choose a name for the output file based on a naming convention, and then choose a location; or click the text next to the Output To heading to enter any name. (See Specify filenames and locations for rendered output.)

3 Click the triangle to the right of the Render Settings heading to choose a render settings template, or click the underlined text to the right of the Render Settings heading to customize the settings. (See Render settings.)

4 Choose a Log type from the Log menu.

   When a log file has been written, the path to the log file appears under the Render Settings heading and Log menu.

5 Click the triangle to the right of the Output Module heading to choose an output module settings template, or click the underlined text to the right of the Output Module heading to customize the settings. You use the output module settings to specify the file format of the output movie. In some cases, a format-specific dialog box opens after you choose a format, in which you can choose format-specific settings. (See Output modules and output module settingsand Encoding and compression options for movies.)

   When an output name and location have been set, and render settings and an output module have been selected, the entry in the Render column automatically becomes selected (shown by a check mark) and the status changes to Queued. The status Queued means that the render item is in the render queue.

   Press Caps Lock before you start rendering to prevent the Composition panel from displaying rendered frames. By not updating the Composition panel, After Effects requires less time to process simple render items with many frames.

6 Click the Render button in the upper-right corner of the Render Queue panel.

Rendering a composition into a movie can take a few seconds or many hours, depending on the composition's frame size, quality, complexity, and compression method. As After Effects renders the item, you are unable to work in the program. An audio alert indicates when rendering is complete.

See this tutorial to learn how to use the render queue to export files.

When rendering of a render item is complete, it remains in the Render Queue panel with its status changed to Done until you remove the item from the Render Queue panel. You cannot rerender a completed item, but you can duplicate it to create a new item in the queue with the same settings or with new settings.

After an item has been rendered, you can import the finished movie as a footage item by dragging its output module from the Render Queue panel into the Project panel. (See Import footage items.)

Render item statuses

Each render item has a status, which appears in the Status column in the Render Queue panel:

Unqueued The render item is listed in the Render Queue panel but is not ready to render. Confirm that you have selected the desired render settings and output module settings, and then select the Render option to queue the render item.

Queued The render item is ready to render.

Needs Output An output filename has not been specified. Choose a value from the Output To menu, or click the underlined Not Yet Specified text next to the Output To heading to specify a filename and path.

Failed After Effects was unsuccessful in rendering the render item. Use a text editor to view the log file for specific information on why the rendering was unsuccessful. When a log file has been written, the path to the log file appears under the Render Settings heading and Log menu.

User Stopped The rendering process was stopped.

Done The rendering process for the item is complete.

Manage render items and change render statuses

- **Select the source composition for a render item in the Project panel**: Right-click (Windows) or Control-click (Mac OS) the render item and choose **Reveal Composition In Project** from the context menu.
- **Remove a render item from the render queue (change its status from Queued to Unqueued)**: Deselect the item entry in the Render column. The item remains in the **Render Queue** panel.
- **Change the status of a render item from Unqueued to Queued**: Select the item in the Render column.
- **Remove a render item from the Render Queue panel**: Select the item and press **Delete**, or choose **Edit > Clear**.
- Rearrange items in the Render Queue panel: Drag an item up or down the queue. A heavy black line appears between render items, indicating where the item will be placed. You can also reorder selected render items by choosing **Layer > Arrange**, and then choosing **Bring Render Item Forward**, **Send Render Item Backward**, **Bring Render Item To Front**, or **Send Render Item To Back**
- **Move selected render items up (earlier) in the render queue**: Press Ctrl+Alt+Up Arrow (Windows) or Command+Option+Up Arrow (Mac OS).
- **Move selected render items down (later)**: Press Ctrl+Alt+Down Arrow (Windows) or Command+Option+Down Arrow (Mac OS).
- **Move selected render items to the top of the render queue**: Press Ctrl+Alt+Shift+Up Arrow (Windows) or Command+Option+Shift+Up Arrow (Mac OS).
- **Move selected render items to the bottom (end) of the render queue**: Press Ctrl+Alt+Shift+Down Arrow (Windows) or Command+Option+Shift+Down Arrow (Mac OS).
- **Duplicate a render item**: Right-click (Windows) or Control-click (Mac OS) the render item and choose a command from the context menu:
  - **Render with the same filename**: Choose **Duplicate With File Name.**
  - **Render with a new filename**: Choose **Duplicate**, click the underlined filename next to **Output To**, enter a new filename, and click **Save**.

Pause or stop rendering

If the disk (to which an output module is writing) runs out of space, After Effects pauses the render operation. You can clear additional disk space and then resume rendering and exporting.

- To pause rendering, click Pause. To resume rendering, click Continue.

  While rendering is paused, you cannot change settings or use After Effects in any other way.

- To stop rendering with the purpose of starting the same render over again, Alt-click (Windows) or Option-click (Mac OS) Stop.

  The render item for which rendering was stopped is assigned the status User Stopped, and a new item with the status of Queued is added to the Render Queue panel. The new item uses the same output filename and has the same duration as the original render item.

- To stop rendering with the purpose of resuming the same render, click Stop.

The render item for which rendering was stopped is assigned the status User Stopped, and a new item with the status of Unqueued is added to the Render Queue panel. The new item uses an incremented output filename and resumes rendering at the before frame at which rendering was stopped—so the first frame of the new item is the last successfully rendered frame of the stopped item.

Information shown for current render operations

Basic information about the current batch of renders is shown at the bottom of the Render Queue panel:

Message A status message. For example, Rendering 1 of 4.

RAM Memory available for the rendering process.

Renders Started The date and time at which the current batch of renders was started.

Total Time Elapsed The rendering time elapsed (not counting pauses) since the current batch of renders was started.

Most Recent Error The path where the log files are located.

To view more information about the current render operation, click the triangle to the left of the Current Render heading. The Current Render pane collapses (closes) after a short time. To prevent it from collapsing after a time-out period, Alt-click (Windows) or Option-click (Mac OS) the triangle next to the Current Render heading. To view details of a completed render, review the log file. When a log file has been written, the path to the log file appears under the Render Settings heading and Log menu.

Change the render-complete sounds

A chime plays when all items in the render queue have been rendered and exported; a different sound plays if a render operation fails. You can change the render-complete sounds by replacing files named *rnd_okay.wav* and *rnd_fail.wav* in the sounds folder. The sounds folder is in the following location:

- *Program Files\\Adobe\\Adobe After Effects CC 2015\\Support Files* (Windows)
- *Applications/Adobe After Effects CC/Contents/Resources* (Mac OS)

Render and export with Adobe Media Encoder

From an expert: Export a composition from After Effects to Adobe Media Encoder

From an expert: Export a composition from After Effects to Adobe Media Encoder

You can also export After Effects compositions directly into Adobe Media Encoder, which offers the flexibility to continue working in After Effects while files are being processed. When you use Adobe Media Encoder, you can also use additional presets and options that are not available in the After Effects Render Queue.

You can add your composition to the Adobe Media Encoder Queue using one of the following methods:

- **Add to Adobe Media Encoder Queue** (**Composition > Add to Adobe Media Encoder Queue** or **File > Export > Add to Adobe Media Encoder Queue**) for final rendering using presets and settings specified in Adobe Media Encoder.

- **Queue in AME** button in the render queue (**Window > Render Queue**) for rendering a draft copy of your composition using the render settings specified in the rendering queue, while you continue to work on the composition.

For information about using Adobe Media Encoder for rendering, see Encode video or audio items in Adobe Media Encoder.

Note:

The output module settings, such as format settings or color channel selection, are not transferred to Adobe Media Encoder when you choose the Queue in AME option. The output filename and location are transferred, however, Adobe Media Encoder does not use the filename and location templates, which may result in image sequence numbering mismatch.

Add a composition directly to Adobe Media Encoder

To add a composition to Adobe Media Encoder, do the following:

1. Drag the After Effects project containing the composition you want to encode into the Encoding Queue in Adobe Media Encoder.

   You can add a composition to Adobe Media Encoder from After Effects. Do one of the following:

   - Choose **Composition > Add To Adobe Media Encoder Queue**
   - Choose **File > Export > Add to Adobe Media Encoder Queue**
   - Press *Ctrl+Alt+M* (Windows) or *Command+Option+M* (Mac OS)

2. The Import After Effects Composition dialog box opens. Choose the composition you want to encode.
3. Encode the file as you normally would by choosing presets and an output location in Adobe Media Encoder.

Add a composition from render queue to Adobe Media Encoder

To add a composition to the Adobe Media Encoder with render settings for draft rendering:

1. Choose Composition > Add to Render Queue or press the keyboard shortcut Control + M (Windows) or Command + M (Mac).
2. In the Render Queue panel, click the Queue in AME button.

Choosing formats and output settings

After Effects provides various formats and compression options for output. Which format and compression options you choose depends on how your output will be used. For example, if the movie that you render from After Effects is the final product that will be played directly to an audience, then you need to consider the medium from which you'll play the movie and what limitations you have on file size and data rate. By contrast, if the movie that you create from After Effects is an intermediate product that will be used as input to a video editing system, then you should output without compression to a format compatible with the video editing system. (See Planning your work.)

Keep in mind the fact that you can use different encoding and compression schemes for different phases of your workflow. For example, you may choose to export a few frames as full-resolution still images (for example, TIFF files) when you need approval from a customer about the colors in a shot; whereas you may export the movie using a lossy encoding scheme (for example, H.264) when you need approval for the timing of the animation.

Supported output formats

You can add the ability to export other kinds of data by installing plug-ins or scripts provided by parties other than Adobe.

Unless otherwise noted, all image file formats are exported at 8 bits per channel (bpc).

Video and animation formats

- QuickTime (MOV)
- Video for Windows (AVI; Windows only)

To create an animated GIF movie, first render and export a QuickTime movie from After Effects. Then import the QuickTime movie into Photoshop and export the movie to animated GIF.

Video project formats

- Adobe Premiere Pro project (PRPROJ)

Still-image formats

- Adobe Photoshop (PSD)
- Cineon (CIN, DPX)
- Maya IFF (IFF)
- JPEG (JPG, JPE)
- OpenEXR (EXR)
- PNG (PNG)
- Radiance (HDR, RGBE, XYZE)
- SGI (SGI, BW, RGB)
- Targa (TGA, VBA, ICB, VST)
- TIFF (TIF)

Audio-only formats

- Audio Interchange File Format (AIFF)
- MP3
- WAV

Collect files in one location

The Collect Files command gathers copies of all the files in a project or composition into a single location. Use this command before rendering, for archiving, or for moving a project to a different computer system or user account.

When you use the Collect Files command, After Effects creates a new folder and the following information is saved in the new folder:

- A new copy of the project
- Copies of the footage files
- Proxy files as specified

- A report describing the files, effects, and fonts necessary to re-create the project and render the compositions.

After you collect files, you can continue making changes to a project, but be aware that those changes are stored with the original project and not with the newly collected version.

1. Choose File > Dependencies > Collect Files.
2. In the Collect Files dialog box, choose an appropriate option for Collect Source Files.

   All Collects all footage files, including unused footage and proxies.

   For All Comps Collects all footage files and proxies used in any composition in the project.

   For Selected Comps Collects all footage files and proxies used in compositions currently selected in the Project panel.

   For Queued Comps Collects all footage files and proxies used directly or indirectly in any of the compositions with a Queued status in the Render Queue panel.

   None (Project Only) Copies the project to a new location without collecting any source footage.
3. Select other options, as appropriate:

   Generate Report Only Selecting this option does not copy the files and proxies.

   Obey Proxy Settings Use this option with compositions that include proxies to specify whether you want the copy to include the current proxy settings. If this option is selected, only the files used in the composition are copied. If this option is not selected, the copy contains both proxies and source files, so you can later change proxy settings in the collected version.

   Note:

   If you choose For Queued Comps in the Collect Source Files dialog box, After Effects uses the proxy settings from the render settings, not the composition.

   Reduce Project Removes all unused footage items and compositions from the collected files when the following options are chosen in the Collect Source Files menu: For All Comps, For Selected Comps, and For Queued Comps.

   Change Render Output To Use to redirect the output modules to render files to a named folder in the collected files folder. This option ensures that you have access to your rendered files when you're rendering the project from another computer. Rendering status must be valid (Queued, Unqueued, or Will Continue) for the output modules to render files to this folder.

   Enable 'Watch Folder' Render You can use the Collect Files command to save projects to a specified watch folder and then initiate watch-folder rendering over a network. After Effects also includes a render control file called *[project name]*_RCF.txt, which signals to watching computers that the project is available for rendering. After Effects and any installed render engines can then render the project together across a network. (See Set up watch-folder rendering.)

   Maximum Number Of Machines Use to specify the number of render engines or licensed copies of After Effects that you want to allocate to render the collected project. Below this option, After Effects reports how many items in the project will be rendered using more than one computer.

   Note:

   If rendering time is unusually long, you may have set Maximum Number Of Machines too high, and the network overhead required to track rendering progress among all computers is out of proportion to the time spent actually rendering frames. The optimal number depends on many variables related to the network configuration and the computers on it; experiment to determine the optimal number for your network.

4 To add your own information to the report that will be generated, click Comments, enter your notes, and click OK. The comments appear at the end of the report.

5 Click Collect. Name the folder and specify a location for your collected files.

Once you start the file collection, After Effects creates the folder and copies the specified files to it. The folder hierarchy is the same as the hierarchy of folders and footage items in your project. The new folder includes a (Footage) folder and may include an output folder (if you selected Change Render Output To).

The names of these folders appear in parentheses to signal to any attending render engines that they should not search these folders for projects.

Specify filenames and locations for rendered output

You can locate a previously rendered item or check the destination of a queued render item by expanding the Output Module group in the Render Queue panel and clicking the underlined file path, or by right-clicking (Windows) or Control-clicking (Mac OS) the Output Module heading.

Specify the filename and location for a single render item

- To manually enter a filename and destination folder, click the underlined text next to the Output To heading.
- To name a file using a file naming template, click the triangle next to the Output To heading, and choose a template from the menu.

Create and use a custom file naming template

You can use custom templates to name the output according to properties of the composition and project.

To make a file naming template the default template, hold down Ctrl (Windows) or Command (Mac OS) as you choose the template from the Output To menu.

1 In the Render Queue panel, choose Custom from the Output To menu.

2 If you want to base the new file-naming template on an existing template, choose the existing template from the Preset menu.

3 Click in the Template box where you want to insert a file-naming rule, and do any of the following:

- To add a preset property to the filename, choose the property from the Add Property menu.
- Enter text in the Template box.

Note:

Make sure that the insertion point is outside the square brackets [ ] of preset properties.

4 Do any of the following:

- To save the file-naming template as a preset for future use in the Output To menu, click the Save button 🖫. In the Choose Name dialog box, enter a name for the file-naming template, and click OK.
- To always use the selected file-naming template, select Default.
- To apply the selected file-naming template to the current Output Module, click OK.

Name output files automatically

The Use Default File Name And Folder preference ensures that all compositions added to the render queue are automatically assigned a unique output filename (except for files created by saving previews, which still use the composition name). When this option is selected, each render item is assigned the same folder name as the previous render item until you change the path. If a composition is rendered more than once, After Effects adds a number to the filename (for example, composition_name_1).

Note:

Avoid using high-ASCII or other extended characters in filenames for projects to be used on different platforms or rendered using a watch folder.

1. Choose Edit > Preferences > Output (Windows) or After Effects > Preferences > Output (Mac OS).
2. Select Use Default File Name And Folder.

Support for paths in templates

You can add paths to templates. Absolute paths can be defined in a template. For example, you can define and save a template that always places rendered files in *E:\\Output\\[compName].[extension]*.

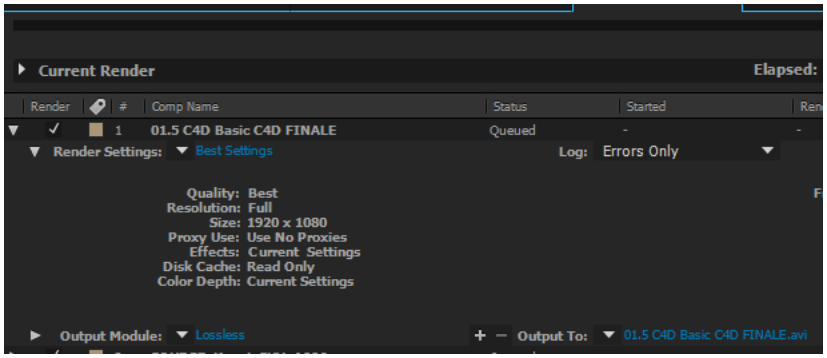
Render settings

Render settings apply to each render item and determine how the composition is rendered for that specific render item. By default, the render settings for a render item are based on the current project settings, composition settings, and switch settings for the composition on which the render item is based. However, you can modify the render settings for each render item to override some of these settings.

Render settings apply to the root composition for a render item, as well as all nested compositions.

Note:

Render settings only affect the output of the render item with which they're associated; the composition itself is not affected.



Render settings

Change render settings

- To change render settings for a render item, click the render settings template name next to the Render Settings heading in the Render Queue panel, and choose settings in the Render Settings dialog box.
- To apply a render settings template to selected render items, click the triangle next to the Render Settings heading in the Render Queue panel, and choose a template from the menu. You can choose a custom render settings template or one of the preset render settings templates:

Best Settings: Often used for rendering to final output.

Draft Settings: Often appropriate for reviewing or testing motion.

DV Settings: Similar to Best Settings, but with Field Rendering turned on, set to Lower Field First.

Multi-Machine Settings: Similar to Best Settings, but with Skip Existing Files selected to enable multi-machine rendering.

Note:

The default render settings template is assigned to a render item when it is created. To change which render settings template is the default, hold down Ctrl (Windows) or Command (Mac OS) as you choose a render settings template from the menu.

Create, edit, and manage render settings templates

You perform the following tasks in the Render Settings Templates dialog box. To open the Render Settings Templates dialog box, choose Edit > Templates > Render Settings, or click the triangle next to the Render Settings heading in the Render Queue panel and choose Make Template.

- To make a new render settings template, click New, specify render settings, and click OK. Enter a name for the new template.
- To edit an existing render settings template, choose a template from the Settings Name menu, click Edit, and specify render settings.

Note:

Changes to an existing template do not affect render items that are already in the render queue.

- To specify a default render settings template to be used when rendering movies, individual frames, pre-rendered movies, or proxies, choose a template from a menu in the Defaults area of the Render Settings Templates dialog box.
- To save all currently loaded render settings templates to a file, click Save All.
- To load a saved render settings template file, click Load, select the render settings template file, and then click Open.

Render settings reference

Each of these settings overrides composition settings, project settings, or layer switch settings.

Log You can choose how much information After Effects writes to a render log file. If you choose Errors Only, After Effects only creates the file if errors are encountered during rendering. If you choose Plus Settings, a log file is created that lists the current render settings. If you choose Plus Per Frame Info, a log file is created that lists the current render settings and information about the rendering of each frame. When a log file has been written, the path to the log file appears under the Render Settings heading and Log menu.

Quality The quality setting to use for all layers. (See Layer image quality and subpixel positioning.)

Resolution Resolution of the rendered composition, relative to the original composition dimensions. (See Resolution.)

Note:

If you render at reduced resolution, set the Quality option to Draft. Rendering at Best quality when reducing resolution produces an unclear image and takes longer than Draft quality.

Disk Cache Determines whether the disk cache preferences are used during rendering. Read Only writes no new frames to the disk cache while After Effects renders. Current Settings (default) uses the disk cache settings defined in the Media & Disk Cache preferences.

Proxy Use Determines whether to use proxies when rendering. Current Settings uses the settings for each footage item. (See Placeholders and proxies.)

Effects Current Settings (default) uses the current settings for Effect switches . All On renders all applied effects. All Off renders no effects.

Solo Switches Current Settings (default) uses the current settings for Solo switches for each layer. All Off renders as if all Solo switches are off. (See Solo a layer.)

Guide Layers Current Settings renders guide layers in the top-level composition. All Off (the default setting) does not render guide layers. Guide layers in nested compositions are never rendered. (See Guide layers.)

Color Depth Current Settings (default) uses the project bit depth. (See Color depth and high dynamic range color.)

Frame Blending On For Checked Layers renders frame blending only for layers with the Frame Blending switch set, regardless of the Enable Frame Blending setting for the composition. (See Frame blending.)

Field Render Determines the field-rendering technique used for the rendered composition. Choose Off if you are rendering for film or for display on a computer screen. (See Interlaced video and separating fields.)

3:2 Pulldown Specifies the phase of 3:2 pulldown. (See Introduce 3:2 pulldown.)

Motion Blur Current Settings uses the current settings for the Motion Blur layer switch and the Enable Motion Blur composition switch. On For Checked Layers renders motion blur only for layers with the Motion Blur layer switch set, regardless of the Enable Motion Blur setting for the composition. Off For All Layers renders all layers without motion blur regardless of the layer switch and composition switch settings. (See Motion blur.)

Time Span How much of the composition to render. To render the entire composition, choose Length Of Comp. To render only the part of the composition indicated by the work area markers, choose Work Area Only. To render a custom time span, choose Custom. (See Work area.)

Frame Rate The sampling frame rate to use when rendering the movie. Select Use Comp's Frame Rate to use the frame rate specified in the Composition Settings dialog box, or select Use This Frame Rate to use a different frame rate. The actual frame rate of the composition is unchanged. The frame rate of the final encoded movie is determined by the output module settings. (See Frame rate.)

Skip Existing Files Lets you rerender part of a sequence of files without wasting time on previously rendered frames. When rendering a sequence of files, After Effects locates files that are part of the current sequence, identifies the missing frames, and then renders only those frames, inserting them where they belong in the sequence. You can also use this option to render an image sequence on multiple computers. (See Render farming - Render a still-image sequence with multiple computers.)

Note:

The current image sequence must have the same name as the existing image sequence, and the starting frame number, frame rate, and time span must be the same. You must render to the folder that contains the previously rendered frames.

Output modules and output module settings

Output module settings apply to each render item and determine how the rendered movie is processed for final output. Use output module settings to specify file format, output color profile, compression options, and other encoding options for final output.

You can also use output module settings to crop, stretch, or shrink a rendered movie; doing this after rendering is often useful when you are generating multiple kinds of output from a single composition.

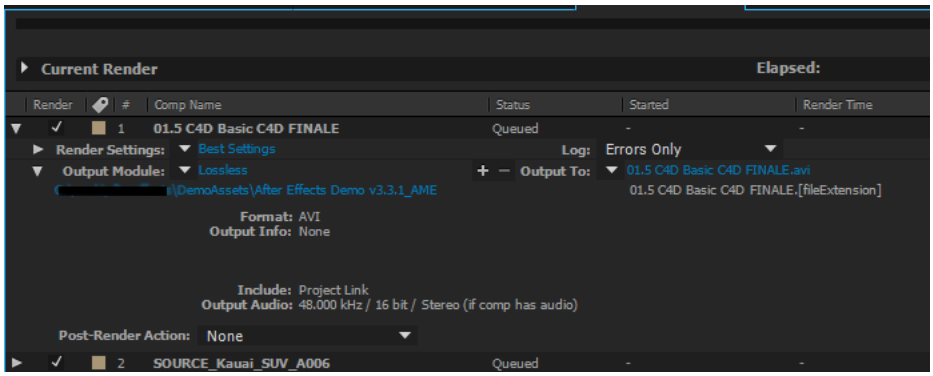
Output module settings are applied to the rendered output that is generated according to the render settings.

For some formats, an additional dialog box opens when you choose the format in the Output Module Settings dialog box. You can modify these settings and use settings presets to specify format-specific options, such as compression options.

You can apply multiple output modules to each render item, which is useful when you want to make more than one version of a movie from one render. For example, you can automate the creation of a movie and its alpha matte, or you can create high-resolution and low-resolution versions of a movie.

Note:

Before rendering, check the Audio Output settings in the Output Module Settings dialog box to ensure that they are correct. To render audio, Audio Output must be selected. If your composition does not include audio, do not select Audio Output, so that the size of the rendered file does not increase needlessly.



You can set the output module of multiple render queue items at the same time. Select the render queue items, and then choose an output module template from the Output Module Settings menu for one of the items.

You can drag an output module to the Project panel to import the finished movie or a placeholder into the project for use as a footage item. (See Import footage items.)

Andrew Kramer provides a video tutorial with tips for working with proxies, output modules, and output module templates on the Video Copilot website.

Change output module settings

- To change output module settings for a render item, click the underlined output module settings template name next to the Output Module heading in the Render Queue panel, and choose settings in the Output Module Settings dialog box.
- To apply an output module settings template to selected render items, click the triangle next to the Output Module heading in the Render Queue panel, and choose a template from the menu.

  You can choose a custom output module settings template or one of the preset output module settings templates. Several templates are provided, including the Lossless template for creating movies for transfer to video, film, or an NLE system.

Note:

The default output module settings template is assigned to a render item when it is created. To change which output module template is the default, hold down Ctrl (Windows) or Command (Mac OS) as you choose an output module template from the menu.

To change output module settings for multiple output modules at once, select the output modules and then choose an output module template. The template is applied to all selected output modules.

Create, manage, and edit output module templates

You perform the following tasks in the Output Module Templates dialog box. To open the Output Module Templates dialog box, choose Edit > Templates > Output Module, or click the triangle next to the Output Module heading in the Render Queue panel and choose Make Template.

- To make a new output module settings template, click New, specify output module settings, and click OK. Enter a name for the new template.
- To edit an existing output module settings template, choose a template from the Settings Name menu, click Edit, and specify output module settings.

Note:

Changes to an existing template do not affect render items that are already in the render queue.

- To specify a default output module settings template to be used when processing movies, individual frames, previews, pre-rendered movies, or proxies, choose a template from a menu in the Defaults area of the Output Module Templates dialog box.
- To save all currently loaded output module templates to a file, click Save All.
- To load a saved output module template file, click Load, select the output module template file, and then click Open.

Add output modules to and remove output modules from render items

- To add a new output module with default settings to a single render item, click the plus (+) sign to the left of the Output To heading of the last output module for the render item.
- To remove an output module from a render item, click the minus (-) sign to the left of the Output To heading of the output module.
- To add a new output module with default settings to selected render items, choose Composition > Add Output Module.
- To duplicate selected output modules, press Ctrl+D (Windows) or Command+D (Mac OS).

Output module settings

For information on using controls in the Color Management area of the Output Module Settings dialog box, see Assign an output color profile.

Format Specifies the format for the output file or sequence of files.

Include Project Link Specifies whether to include information in the output file that links to the source After Effects project. When you open the output file in another application, such as Adobe Premiere Pro, you can use the Edit Original command to edit the source project in After Effects.

Include Source XMP Metadata Specifies whether to include XMP metadata in the output file from the files used as sources for the rendered composition. XMP metadata can travel all the way through After Effects from source files, to footage items, to compositions, to rendered and exported files. For all default output module templates, Include Source XMP Metadata is deselected by default. (See Exporting XMP metadata from After Effects.)

Post-Render Action Specifies an action for After Effects to perform after the composition is rendered. (See Post-render actions.)

Format Options Opens a dialog box in which you specify format-specific options.

Channels The output channels contained in the output movie. After Effects creates a movie with an alpha channel if you choose RGB+Alpha, implying a depth of Millions of Colors+. Not all codecs support alpha channels.

Note:

All files created with a color depth of Millions of Colors+, Trillions of Colors+, or Floating Point + have labeled alpha channels; information describing the alpha channel is stored in the file. Therefore, you do not have to specify an alpha interpretation each time you import an item created in After Effects.

Depth Specifies the color depth of the output movie. Certain formats may limit depth and color settings.

Color Specifies how colors are created with the alpha channel. Choose from either Premultiplied (Matted) or Straight (Unmatted). (See Alpha channel interpretation: premultiplied or straight.)

Starting # Specifies the number for the starting frame of a sequence. For example, if this option is set to 38, After Effects names the first frame *[file_name]*_00038. The Use Comp Frame Number option adds the starting frame number in the work area to the starting frame of the sequence.

Resize Specifies the size of your output movie. Select Lock Aspect Ratio To if you want to retain the existing frame aspect ratio when resizing the frame. Select Low Resize Quality when rendering tests, and select High Resize Quality when creating a final movie. (See Scaling a movie downand Scaling a movie up.)

Crop Used to subtract or add rows or columns of pixels to the edges of the output movie. You can specify the number of rows or columns of pixels to be added or subtracted from the top, left, bottom, and right sides of the movie. Use positive values to crop, and use negative values to add rows or columns of pixels. Select Region Of Interest to export only the region of interest selected in the Composition or Layer panel. (See Region of interest (ROI).)

By adding one row of pixels to the top and subtracting one row from the bottom of a movie, you can change the field order.

Audio Output Specifies the sample rate, sample depth (8 Bits or 16 Bits), and playback format (Mono or Stereo). Choose a sample rate that corresponds to the capability of the output format. Choose an 8-bit sample depth for playback on the computer, and a 16-bit sample depth for CD and digital audio playback or for hardware that supports 16-bit playback.

Note:

The specifications for some formats impose limits on audio parameters. In such cases, audio options may be unavailable for modification in the Output Module Settings dialog box. Also, audio options for some formats are set in the export settings dialog box for that format. For example, to set audio output options for Windows Media, click Format Options in the Output Module Settings dialog box.

Warning for mismatch in frame rate or dimensions

Some formats enforce constraints on frame dimensions and frame rate.

If you choose such a constrained output format, and your composition, its render settings, or its output module settings don't match the constraints, then After Effects shows a yellow warning icon and the message "Settings mismatch" at the bottom of the Output Module Settings dialog box.

Click the warning icon to see a detailed message that describes how the output file will be modified to meet the format constraints. You can go back and change composition settings, render settings, and output module settings if you don't want After Effects to make the changes automatically in the output module.

For more information about output module constraints and the warnings for mismatches in frame rate, dimensions, and pixel aspect ratio, see the Adobe website.

Encoding and compression options for movies

Compression is essential for reducing the size of movies so that they can be stored, transmitted, and played back effectively. Compression is achieved by an encoder; decompression is achieved by a decoder. Encoders and decoders are known by the common term *codec*. No single codec or set of settings is best for all situations. For example, the best codec for compressing cartoon animation is generally not efficient for compressing live-action video. Similarly, the best codec for playback over a slow network connection is generally not the best codec for an intermediate stage in a production workflow. For information on planning your work with final output in mind, see Planning your work.

After Effects uses an embedded version of the Adobe Media Encoder to encode most movie formats through the Render Queue panel. When you manage render and export operations with the Render Queue panel, the embedded version of the Adobe Media Encoder is called automatically. The Adobe Media Encoder appears only in the form of the export settings dialog boxes with which you specify some encoding and output settings.

Note:

The embedded version of the Adobe Media Encoder used to manage export settings within After Effects output modules does not provide all the features of the full, stand-alone Adobe Media Encoder application. For information about the full, stand-alone Adobe Media Encoder application, see Adobe Media Encoder Help.

For most output formats, you can specify format-specific encoding and compression options. In many cases, a dialog box opens and presents these options when you choose a format to export to or click the Format Options button in the Output Module settings dialog box. (See Output modules and output module settings.)

QuickTime (MOV) encoding and compression settings

1. In the Render Queue panel, click the underlined name of the output module.
2. Choose QuickTime from the Format menu.
3. Click Format Options in the Video Output section.
4. In the QuickTime Options dialog box, choose a codec and set options according to the specific codec and your needs:

   Quality A higher Quality setting produces better image quality but results in a bigger movie file.

   Key Frame Every In QuickTime terminology, the term *key frames* refers to something different from the change-over-time keyframes placed in the After Effects Timeline panel. In QuickTime, key frames are frames that occur at regular intervals in the movie. During compression, they are stored as complete frames. Each intermediate frame that separates them is compared to the previous frame, and only changed data is stored. Using key frames greatly reduces movie size and greatly increases the memory required to edit and render a movie. Shorter intervals between key frames enable faster seeking and reverse playback, but can significantly increase the size of the file.

   Frame Reordering Some codecs allow for frames to be encoded and decoded out of order for more efficient storage.

   Note: For more information on QuickTime, see the Apple website.

5. Click OK.
6. Specify other settings in the Output Module Settings dialog box.

Post-render actions

You can use post-render actions to automate simple tasks that occur after a composition is rendered.

A common example of the use of post-render actions is with pre-rendering: Choosing Composition > Pre-render adds the selected composition to the render queue and sets the Post-Render Action option to Import & Replace Usage.

Note:

You choose Post-Render Action options in the Output Module group, so be aware that changing the Output Module template could also change the Post-Render Action option. (See Output modules and output module settings.)

1. Expand the Output Module group in the Render Queue panel by clicking the arrow to the left of the Output Module heading.
2. Choose one of the following from the Post-Render Action menu:

   None Performs no post-render action. This option is the default.

   Import Imports the rendered file into the project as a footage item when the rendering is complete.

   Import & Replace Usage Imports the rendered file into the project and substitutes it for the specified item. Drag the pick whip to the item to replace in the Project panel to specify it.

   Use the Import & Replace Usage option to create a chain of dependent render items. For example, you can set one render item to use a watch folder and multiple computers to create a still-image sequence, and then the next render item can render a single movie file from that still-image sequence. (See Network rendering with watch folders and render engines.)

   Set Proxy Sets the rendered file as a proxy for the specified item. Drag the pick whip to the item in the Project panel item to specify it.

Rendering and exporting still images and still-image sequences

Render and export a sequence of still images

You can export a rendered movie as a sequence of still images, in which case each frame of the movie is output as a separate still-image file. When you render one movie using multiple computers on a network, the movie is always output as a still-image sequence. Many 3D animation programs accept sequences of still images. Sequences of PNG files are often a good choice for transfer of visual elements from After Effects to Flash Professional.

If you are creating a movie for transfer to film, you will need to create a sequence of still images that you can then transfer to film using a film recorder.

Creating a sequence of PSD files is a good way to transfer frames to Photoshop for touchup and editing. You can then import the image sequence back into After Effects.

When specifying the output filename for a still-image sequence, you actually specify a file-naming template. The name that you specify must contain pound signs surrounded by square brackets (*[#####]*). As each frame is rendered and a filename created for it, After Effects replaces the [#####] portion of the name with a number indicating the order of the frame in the sequence. For example, specifying *mymovie_[#####].tga* would cause output files to be named mymovie_00001.tga, filmout_00002.tga, and so on.

The maximum number of frames in a still-image sequence is 32,766.

Render and export a single frame of a composition

You can export a single frame from a composition, either as an Adobe Photoshop (PSD) file with layers intact or as a rendered image. This is useful for editing files in Adobe Photoshop, preparing files for Adobe Encore, creating a proxy, or exporting an image from a movie for posters or storyboards.

The Photoshop Layers command preserves all layers from a single frame of an After Effects composition in the resulting Photoshop file. Nested compositions up to five levels deep are preserved in the PSD file as layer groups. The PSD file inherits the color bit depth from the After Effects project.

In addition, the layered Photoshop file contains an embedded composite (flattened) image of all the layers. This feature ensures that the file is compatible with applications that don't support Photoshop layers; such applications display the composited image and ignore the layers.

A layered Photoshop file saved from After Effects may look different from the frame viewed in After Effects if the frame uses features that Photoshop doesn't support. For example, if the frame contains a blending mode that isn't available in Photoshop, a blending mode that most resembles it is substituted in the layer, but the embedded composite image (viewable only by applications that don't support Photoshop layers) looks the same. Alternatively, you can render the frame using the Composition > Save Frame As > File command to export a flattened and rendered version of the file to the PSD format.

PSD files generated by Save Frame As > Photoshop Layers have the sRGB IEC61966-2.1 ICC color profile embedded if color management is disabled for the project (the project's working color space is set to None). If color management is enabled for the project (the project's working color space is set to something other than None), then PSD files generated by Save Frame As > Photoshop Layers have the color profile embedded that corresponds to the project's working color space. (See Color management and color profiles.)

1. Go to the frame that you want to export so that it is shown in the Composition panel.
2. Do one of the following:
   - To render a single frame, choose Composition > Save Frame As > File. Adjust settings in the Render Queue panel if necessary, and then click Render.
   - To export a single frame as an Adobe Photoshop file with layers, choose Composition > Save Frame As > Photoshop Layers.

To change the default output settings for the Save Frame As > File command, change the settings for the Frame Default render settings template (See Create, edit, and manage render settings templates.)

Export an After Effects project as an Adobe Premiere Pro project

You can export an After Effects project as an Adobe Premiere Pro project without rendering.

Note:

Projects created using the latest version of Adobe After Effects and saved as Adobe Premiere Pro projects can be opened by the latest version of Adobe Premiere Pro.

When you export an After Effects project as an Adobe Premiere Pro project, Adobe Premiere Pro uses the settings from the first composition in the After Effects project for all subsequent sequences. Keyframes, effects, and other properties are converted in the same way as when you paste an After Effects layer into an Adobe Premiere Pro sequence. (See Importing from After Effects and Adobe Premiere Pro.)

1. Choose File > Export > Adobe Premiere Pro Project.
2. Specify a filename and location for the project, and click Save.

Note:

You can also import Adobe Premiere Pro projects and sequences into After Effects, copy and paste between After Effects and Premiere Pro, and use Dynamic Link to exchange data between After Effects and Premiere Pro.

Converting movies

Convert footage items between video formats

You can use After Effects to convert one kind of video to another. When converting video, keep in mind the following guidelines:

- Changes in resolution may result in a loss of picture clarity, especially when up-converting from a standard-definition format to a high-definition format.
- Changes in frame rate may require the use of frame blending to smooth out the interpolated frames. For longer footage items, the use of frame blending can result in very long render times.

1. Import the footage you're converting into a composition using the preset of the format you're converting to. Example: if you're converting NTSC to PAL, add your NTSC footage item to a composition with the appropriate PAL composition settings preset.
2. Select the layer with the footage to be converted and choose Layer > Transform > Fit To Comp Width (or Fit To Comp Height).

   Note:

   For converting between two formats with the same frame aspect ratio, either of these two Fit commands does the same thing; if the frame aspect ratios differ (for example, going from 4:3 to 16:9), fitting to width or height chooses between cropping or letterboxing the resulting image.

3. Do one of the following:

   - If your footage has no scene cuts, choose Layer > Frame Blending > Pixel Motion. Pixel Motion provides the best results for interpolation of frames, but may require long rendering times.

- If your footage has scene cuts, or if you want to sacrifice quality for shorter rendering times, choose Layer > Frame Blending > Frame Mix.

4 Choose Composition > Add To Render Queue.

5 In the Render Queue panel, next to Render Settings, choose the appropriate preset from the menu. For example, if you're converting to DV footage, select DV Settings from the menu.

6 In the Render Queue panel, next to Output Module, choose the appropriate output module preset from the menu, or choose Custom to enter custom settings. For example, if you're converting to DV PAL, choose the D1/DV-PAL output module preset with the audio sampling rate that you require.

7 Click the name of the output module preset that you chose in step 6 to select additional Format Options.

8 Specify a name and destination for the output file using the controls to the right of the Output To heading in the Render Queue panel. (See Specify filenames and locations for rendered output.)

9 Click the Render button to render your movie.

Convert DV footage from PAL to NTSC using pulldown

Because After Effects can easily convert film (24 fps) to video (29.97 fps) using 3:2 pulldown, you can perform a clean PAL-to-NTSC transfer by setting up 25-fps PAL video to act like 24-fps film. This lets you apply 3:2 pulldown to the footage when converting to 29.97 fps. This technique works especially well for progressive (noninterlaced) PAL video.

1 Create a new composition with the DV NTSC or DV NTSC Widescreen preset.

2 Import your DV PAL footage into the new composition.

3 Select the layer with the DV PAL footage, and choose Layer > Transform > Fit To Comp Width (or Fit To Comp Height).

4 Do one of the following:

- To preserve audio synchronization but slightly lower the pitch, choose Layer > Time > Time Stretch, and then enter *95.904* in the Stretch Factor box.
- To preserve audio pitch but not synchronization, or for clips without audio, right-click (Windows) or Control-click (Mac OS) the footage item in the Project panel, select Interpret Footage > Main, select Conform To Frame Rate, and then enter *23.976* in the Conform To Frame Rate box.

5 Choose Composition > Add To Render Queue.

6 Choose Custom from the Render Settings menu.

7 In the Render Settings pane, enable Field Rendering (choose the field order required by your output type), select any option from the 3:2 Pulldown menu, and then click OK.

8 Choose the output type from the Render Queue Output Module menu (for example, Microsoft DV NTSC 32 kHz).

9 Specify a name and destination for the output file using the controls to the right of the Output To heading in the Render Queue panel. (See Specify filenames and locations for rendered output.)

10 Click the Render button to render your movie.

Scaling a movie down

Several methods exist for producing a reduced-size movie from your composition, each with tradeoffs between speed and quality:

Nest the composition Create a new composition at the smaller dimensions, and nest the large composition inside it. For example, if you create a 640x480 composition, place it in a 320x240 composition. Use the Fit To Comp command

to scale the composition to fit the new smaller composition size: Press Ctrl+Alt+F (Windows) or Command+Option+F (Mac OS), and then collapse transformations by choosing Layer > Switches > Collapse. The resulting composition rendered at full resolution and best quality will have excellent image quality, better than if you had rendered using a reduced resolution.

Resize the composition This method produces the highest quality reduced-size movie but is slower than nesting. For example, if you create a 640x480 composition and render it at full resolution, you can set the Resize value in the Output Module Settings dialog box to 50% to create a 320x240 movie. For a composition rendered at full resolution, the image quality is excellent when the Resize Quality is set to High.

Note:

Do not use resizing to change the vertical dimensions of a movie when field rendering is on. Resizing vertically mixes the field order, which distorts motion. Use either cropping or composition nesting if you need to vertically resize a field-rendered movie.

Crop the composition This method is ideal for reducing the size of a movie by a few pixels. Use the Crop options in the Output Module Settings dialog box. Remember that cropping cuts off part of the movie, so objects centered in the composition may not appear centered unless the movie is cropped evenly on opposite edges.

Note:

In some special cases, After Effects will automatically crop rather than scale when creating an output movie with dimensions that don't match the dimensions of the composition. For example, when creating a 720x480 movie with a pixel aspect ratio of 0.91 or 1.21 from a 720x486 composition, After Effects will crop instead of scale.

Crop to a region of interest To render just a portion of the composition frame, define a region of interest in the Composition panel. Then, select the Region Of Interest option in the Output Module Settings dialog box before rendering. (See Region of interest (ROI).)

Note:

Cropping an odd number of pixels from the top of a field-rendered movie reverses the field order. For example, if you crop one row of pixels from the top of a movie with Upper Field First field rendering, the field-rendering order then becomes Lower Field First. Remember that if you crop pixels from the top of the movie, you need to add to the bottom row of the movie to maintain the original size. If you don't mind losing one scan line, this technique gives you a way to output two movies from one render, each with a different field order.

Render the composition at a reduced resolution This method is the fastest for creating reduced-size movies. For example, if you create a 640x480 composition, you can set the composition resolution to one half, reducing the size of the rendered composition to 320x240. You can then create movies or images at this size. The reduced resolution reduces the sharpness of the image and is best used for creating preview or draft movies.

Note:

When rendering at reduced resolution, set the quality of the composition to Draft. Rendering at Best quality while reducing resolution does not produce a clean image and takes longer to render than rendering at Draft quality.

Scaling a movie up

Increasing the size of the output from a rendered composition reduces the image quality of a movie and is not recommended. If you must enlarge a movie, to maintain highest image quality, enlarge a composition that was rendered at full resolution and highest quality using one of the following methods:

Nest the composition Create a new composition at the larger dimensions and nest the smaller composition inside it. For example, if you create a 320x240 composition, you can place it in a 640x480 composition. Resize the composition to fit the new larger composition size, and then collapse transformations by choosing Layers > Switches > Collapse. The

resulting composition rendered at full resolution and best quality will have better image quality than if you had resized the movie. However, this method also renders slower than if you created a composition and resized it.

Note:

To create a draft movie with specific dimensions, use both the Resize option and reduced resolution in the rendered composition.

Resize the composition For example, if you create a 320x240 composition and render it at full resolution, you can set the Resize value in the Output Module Settings dialog box to 200% to create a 640x480 movie. For a composition rendered at full resolution, the image quality is usually acceptable.

Note:

Do not use resizing to change the vertical dimensions of a movie with field rendering. Resizing vertically mixes the field order, which distorts any motion. Use either cropping or composition nesting if you need to vertically resize a field-rendered movie.

Crop the composition To enlarge a movie by a few pixels, increase the size using negative values for the Crop options in the Output Module Settings dialog box. For example, to increase the size of a movie by 2 pixels, enter *–2* in the Cropping section of the Output Module Settings dialog box. Remember that negative cropping adds to one side of a movie, so objects originally centered in the composition may not appear centered when the movie is cropped.

Note:

Adding an odd number of pixels to the top of a field-rendered movie reverses the field order. For example, if you add one row of pixels to the top of a movie with Upper Field First field rendering, the field-rendering order then becomes Lower Field First. Remember that if you add pixels to the top of the movie, you need to crop from the bottom row of the movie to maintain the original size.

Adobe Photoshop provides fine control over resampling methods used for scaling of images. For fine control of resampling, you can export frames to Photoshop to change the image size and then import the frames back into After Effects.

For a list of plug-ins that provide high-quality scaling—including some designed to create high-definition images from standard-definition sources—see the Toolfarm website.

For a script that scales multiple compositions simultaneously, see the AE Enhancers forum.

Create a composition and render source footage items simultaneously

You can simultaneously create a composition from source footage and prepare it for rendering. This process is useful when you want to change some characteristic of the source footage, such as frame rate or compression method, and have that rendered version available in your project.

1 Drag one or more footage items from the Project panel to the Render Queue panel, or select the footage items in the Project panel and do one of the following:

- Choose Composition > Add to Render Queue.
- Press Ctrl+Shift+/ or Ctrl+M(Windows) or Command+Shift+/ or Command+M (Mac OS).

Note:

If the Use System Shortcut Keys option is enabled in General preferences (Mac OS), the shortcut is Ctrl+Cmd+M.

2 After Effects creates both a new item in the render queue and a new composition in the Project panel for each footage item.

3 Adjust the render settings as desired, and click Render.

Introduce 3:2 pulldown

If you are creating output for film that's been transferred to video, or if you want to simulate a film look for animation, use 3:2 pulldown. Footage items that were originally film transferred to video and had 3:2 pulldown removed when imported into After Effects can be rendered back to video with 3:2 pulldown reintroduced. You can introduce 3:2 pulldown by choosing one of five different phases. (See Remove 3:2 or 24Pa pulldown from video.)

Note:

It is important to match the phase of a segment that had 3:2 pulldown removed if it will be edited back into the video footage it came from.

1 In the Render Queue panel, select the render item and then click the underlined text next to the Render Settings heading.

2 For Field Render, choose a field order.

3 For 3:2 Pulldown, choose a phase.

4 Select other settings as appropriate, and then click Render.

Chris and Trish Meyer provides an overview of 3:2 pulldown in an article on the Artbeats website.

Test field-rendering order

When you render a composition containing separated footage, set the Field Rendering option to the same field order as your video equipment. If you field-render with the incorrect settings, the final movie may appear too soft, jerky, or distorted. A simple test can determine the order in which your video equipment requires fields.

Note:

The field order might get altered if you change the hardware or software of your production setup. For example, changing your device control software or VCR after setting the field order can reverse your fields. Therefore, any time you change your setup, test the field-rendering order.

The test takes about 15 minutes and involves creating two movie versions of the same composition (one rendered with Upper Field First and one with Lower Field First), and then playing the movies to see which choice looks right.

1 Create a simple composition with the correct frame size and frame rate. Choose an NTSC or PAL preset in the Composition Settings dialog box, and make the composition at least 3 seconds long.

2 Within the composition, make a layer that is a small rectangular solid. The layer can be any color as long as it contrasts sharply with the composition background. You may want to add a title (such as "Upper Field First") to the solid to make identification of the movie easier.

3 Apply some fast movement to the solid using keyframes in its Position property. Set keyframes from the upper-left of the Composition panel to the lower-right for 1 second.

4 Save the project, and then drag the composition to the Render Queue panel.

5 Click the underlined Render Settings name, and then choose Upper Field First from the Field Render menu.

6 Click OK, and then click Render to make the movie.

7 In the composition, change the color of the solid in the Composition panel, and add a new title, such as "Lower Field First", to identify it.

8 Render the composition again, choosing Lower Field First from the Field Render menu in the Render Settings dialog box.

9 Record both movies to the same device.

10 Play both movies.

One movie will look distorted and have jumpy horizontal motion or shape distortion during vertical motion. The other movie will play back smoothly, with sharply defined edges. Use the field order for the smooth-playing movie whenever you render movies with that particular hardware configuration.

Automated rendering and network rendering

Automating rendering with aerender

The executable file *aerender.exe* is a program with a command-line interface with which you can automate rendering. The executable file is located in the same folder as the primary After Effects application. The default locations for this file are:

- Windows: \Program Files\Adobe\Adobe After Effects CC\Support Files
- Mac OS: /Applications/Adobe After Effects CC

You can use the aerender application to perform rendering operations on multiple computers as part of a render farm, or you can use the aerender application on a single computer as part of a batch operation.

You use the program by entering the command *aerender* on the command line (or in a batch script), followed by a series of optional arguments. Some of the arguments are simple options that take no arguments of their own (for example, -*reuse*), whereas others take arguments of their own (for example, -project project_path).

Enter the command aerender -help to show usage information.

The version and build number of the application are written to standard output (stdout).

The render may be performed either by an already running instance of After Effects or by a newly started instance. By default, aerender starts a new instance of After Effects, even if one is already running. To instead use the currently running instance, use the *–reuse* argument.

This example command tells After Effects to render frames 1 through 10 of Composition_1 in *project_1.aep* to a numbered sequence of Photoshop files using a multi-computer render:

```
aerender -project c:\projects\project_1.aep -comp "Composition_1" -s 1 -e 10
-RStemplate "Multi-Machine Settings" -OMtemplate "Multi-Machine Sequence"
-output c:\output\project_1\frames[####].psd
```

To render just Composition_1 to a specified file, enter this command:

```
aerender -project c:\projects\project_1.aep -comp "Composition_1" -output c
:\output\project_1\project_1.avi
```

To render everything in the render queue with current settings in the project file, enter this command:

```
aerender -project c:\projects\project_1.aep
```

Argument	Description
–help	Print usage message.
–version	Display the version number of aerender to the console. Does not render.
–v verbose_flag	verbose_flag specifies the kind of messages reported: *ERRORS*: Reports only fatal and problem errors. *ERRORS_AND_PROGRESS*: (default) Reports errors and progress of rendering.
–reuse	Reuse the currently running instance of After Effects (if found) to perform the render. When an already running instance is used, aerender saves preferences to disk when rendering has completed, but does not quit After Effects. If this argument is not used, aerender starts a new instance of After Effects, even if one is already running. It quits that instance when rendering has completed, and does not save preferences.
–mem_usage image_cache_percentmax_mem_percent	image_cache_percent specifies the maximum percentage of memory used to cache already rendered images and footage. max_mem_percent specifies the total percentage of memory that After Effects can use. For both values, if installed RAM is less than a given amount (n gigabytes), the value is a percentage of the installed RAM, and is otherwise a percentage of n. The value of n is 2 GB for 32-bit Windows, 4 GB for 64-bit Windows, and 3.5 GB for Mac OS.
–project project_path	project_path is a file path or URI specifying a project file to open. If this argument is not used, aerender works with the currently open project. If no project is specified and no project is open, the result is an error.
–comp comp_name	comp_name specifies a composition to render. If the composition is in the render queue already, then the first instance of that composition in the render queue is rendered. If the composition is in the project but not in the render queue, then it is added to the render queue and rendered. If this argument is not used, aerender renders the entire render queue; in this case, only the *–project*, *–log*, *–output*, *–v*, *–mem_usage*, and *–close* arguments are used, and all other arguments are ignored.
–s start_frame	start_frame is the first frame to render. If this argument is not used, aerender uses the start frame in the file.
–e end_frame	end_frame is the last frame to render. If this argument is not provided, aerender uses the end frame in the file.
–i increment	increment is the number of frames to advance before rendering a new frame. A value of 1 (the default) causes normal rendering of all frames. Higher values render a frame and use it increment times in output, and then skip ahead increment frames to begin the cycle again. Higher values result in faster renders but choppier motion.
–OMtemplate output_module_template	output_module_template is the name of a template to apply to the output module. If the template does not exist, using this argument causes an error. If this argument is not used, aerender uses the template already defined for the output module.
–RStemplate render_sett ings_template	render_settings_template is the name of a template to apply to the render item. If the template does not exist, using this argument causes an error. If this argument is not used, aerender uses the render template already defined for the item.

–output output_path	output_path is a file path or URI specifying the destination for the final output file. If this argument is not used, aerender uses the path defined in the project file.
–log log_file_path	log_file_path is a file path or URI specifying the location of the log file. If this argument is not used, aerender uses standard output (stdout).
–sound sound_flag	If sound_flag is *ON*, a sound is played when rendering is complete. Default is *OFF*.
–close close_flag	close_flag specifies whether to close the project when rendering is complete, and whether or not to save changes: *DO_NOT_SAVE_CHANGES*: (default) The project is closed without saving changes. *SAVE_CHANGES*: The project is closed and changes are saved. *DO_NOT_CLOSE*: The project is left open if using an already-running instance of After Effects. (New instances of After Effects must always quit when done.)
-rqindex index_in_render_queue	*-rqindex* works just like *-comp*, except that it won't create a render item from the composition automatically.
-mp	More processes may be created to render multiple frames simultaneously, depending on system configuration and preference settings. (See Memory & Multiprocessing preferences.)
-continueOnMissingFootage	The render operation continues even if a source footage item is missing.

Lloyd Alvarez provides a script on his After Effects Scripts website that takes items that are ready to render in the render queue and sends them to render in the background using aerender.

Network rendering with watch folders and render engines

You can render one or more compositions from a project using multiple computers over a network in a fraction of the time that a single computer would require. Network rendering involves copying the project and source files to a networked folder, and then rendering the project. A network of computers used together to render a single composition is sometimes called a render farm.

Render farming is when a network of computers is used together to render a single composition. You can set this up to work with render-only versions of After Effects called render engines.

You can install render engines in the same manner as the full version of the application. You run the render engine using the Adobe After Effects Render Engine shortcut in the Adobe After Effects CC folder. For more information, see same composition Setup and installation.

You cannot use a watch folder and multiple render engines to simultaneously render a single movie file. However, in render farming, you can use multiple render engines to render a movie as a sequence of still-image files. You can then use a post-render action to create a single movie file from that still-image sequence. For more information, see Post-render actions.

Network considerations

When working with multiple render engines on multiple computers, keep in mind the following guidelines:

- When possible, identify folders using absolute file paths so that the paths are correctly identified for all render engines. Identifying folders using absolute file paths may mean mapping network drives to a particular drive letter on all computers (for example, H:\renders\watch\). Avoid using relative paths (for example, \\renders\watch).

- Each Macintosh computer monitoring the watch folder must have a unique name. Because the default names of computers are often identical, you should rename your computers to not use the default name.
- Make sure that all servers and clients (computers monitoring the watch folder) have hard drives with unique names.
- Do not use the same computer to serve a watch folder and to run After Effects in Watch Folder mode. Use a dedicated server that's accessible to all render engines to serve your watch folder.
- Do not render to or initiate Watch Folder mode on the root of a volume or a shared folder that appears as the root when viewed from another computer. Specify a subfolder instead. Also, avoid using high-ASCII or other extended characters and slashes in filenames. For multiple-computer rendering, After Effects includes the Multi-Machine sample template that you can use as a starting point.

When rendering across a network that includes volumes using different network or operating systems, such as Windows, Mac OS, Novell, and UNIX, make sure that you specify output files using a file-naming convention that's compatible with all rendering or destination volumes.

Project considerations

Make sure that you install all fonts, effects, and encoders (compressors) used in the project on all computers monitoring the watch folder. If a computer monitoring the watch folder can't find fonts, effects, or encoders used in a project, the render fails.

When you install an After Effects render engine on a computer, it contains all the plug-ins included with After Effects. If a composition uses a plug-in from another manufacturer, the plug-in must be present on all computers to render the composition. However, support for network rendering varies among plug-in manufacturers. Before you set up a network to render effects created by third-party plug-ins, see the documentation for your plug-ins or contact the plug-in manufacturers and get answers to the following questions:

- Does the license agreement for the plug-in allow installing multiple copies on a network for the purposes of rendering?
- Are there any other limitations or tips that apply to using the plug-in for network rendering?

Collect Files folder considerations

When you use the File > Collect Files command, files relevant to a project are copied to a single folder. This folder includes a copy of the project file, a *render control file* (RCF), and other files, depending on the options you choose in the Collect Files dialog box. If you save the Collect Files folder to a networked computer other than a server, don't run a render engine on that computer. Avoid saving the Collect Files folder to a local disk, the root level of a disk (such as C: in Windows or the Macintosh HD in Mac OS), or a shared folder, all of which can signify different locations to each render engine. All render engines must interpret the path in the same way.

Once the collected files appear in the watch folder, all monitoring render engines start rendering automatically. If you prefer, you can use the Collect Files command to store compositions and their source footage to a specified location and then initiate the watch-folder rendering process later. Doing so renders the projects in alphabetical order, rather than the order in which they were saved to the location.

Track dependencies of a watch-folder render

You can track render dependencies when you render over a network by setting Post-Render Action options. When you set these options, After Effects confirms that all of the items that have to be rendered are ready and available. For example, if one item depends on another to render, and the first has not finished rendering or has received an error, the second does not render.

You can use this process to render a single QuickTime or AVI movie from a watch-folder render. The movie is created on only one computer.

Note:

This procedure assumes that you have already created a multiple-computer watch-folder.

1. In the Render Queue panel, drag the output module to the Project panel. After Effects creates a placeholder for that item's output.
2. Drag the placeholder back to the Render Queue panel.
3. Set the render settings and output module settings for the placeholder, and click Render.

Start in watch-folder mode

Watch-folder mode applies only to rendering from a folder on your local computer.

- To start After Effects in watch-folder mode automatically, save a project with the filename Watch This Folder.aep. After Effects watches the folder containing the project if you open that project.
- To start After Effects in watch-folder mode when you start your computer, create a shortcut (Windows) or alias (Mac OS) to the Watch This Folder.aep project and move it to your Startup folder (Windows) or your Startup Items folder (Mac OS). After Effects watches the folder containing the project if you open that project.
- (Windows only) To start After Effects in watch-folder mode from the command line, choose Start > Run, and then enter the following, modifying the application path to the exact name of the folder in which you installed After Effects, and replacing C:\[temp] with the path to your watch folder: "C:\Program Files\Adobe\Adobe After Effects CC\Support Files\afterfx.exe" -wf C:\[temp]

To start the After Effects render engine rather than the full version of After Effects, use the -re option with the command.

Note:

You can also use this command line in batch files.

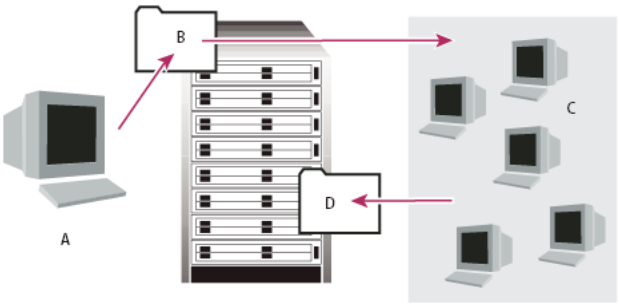
Render farming - Render a still-image sequence with multiple computers

Render farming is when a network of computers is used together to render a single composition. You can set this up to work with render-only versions of After Effects called render engines. Render farming helps reduce the time a single machine takes to export a composition. You can use multiple computers and multiple copies of After Effects to render a composition across a network. You can use multiple computers to render only still-image sequences; you cannot use multiple computers to render a single movie.

Aharon Rabinowitz provides a video tutorial on the Creative COW website that goes through and explains the steps for rendering a still-image sequence with multiple computers.

Set up the network

Follow the process illustrated in the image to understand the requirements to set up the network.



A Computer with full version of After Effects B Save a project and all source files to a folder on a server C Computers with the render engine installed D Open the project and render a still-frame sequence to a designated output folder on the server

You can use any number of computers for rendering; in general, the more computers, the faster the rendering. However, if too many computers are used across a busy network, network traffic may slow down the entire process. You can detect network slowdown by observing the time spent in the **Compressing & Writing** stage in the **Current Render** section of the **Render Queue** panel.

Note:

Adobe does not provide technical support for general network configuration; consult your network administrator.

Render a still-image sequence with multiple computers

Important points in the process of rendering a still image sequence with multiple computers:

- To render a still-image sequence with multiple computers, you can use any number of computers.
- When you render a still-image sequence with multiple computers, rendering in each copy of After Effects starts at approximately the same time.
- If your queued render items are set to **Skip Existing Files** (a Render Settings option), the render process skips the existing frames or frames in progress.
- Multiple computers can render the project simultaneously, writing the still-image sequence to a single folder.

To render a still-image sequence, follow these steps:

1. Install After Effects on each computer that is used to render the project. Make sure that you have the same fonts installed on each computer.

   Note:

   Do not share plug-ins across a network. Make sure that you have a copy of the plug-ins folder on each computer that is running After Effects. When using third-party plug-ins, also be sure that the same plug-ins are available on all computers and that you have sufficient licenses for the plug-ins.

2. Open the project on one computer and select **Composition > Add To Render Queue**.
3. In **Render Queue** panel, specify a format in the **Output Module** area, and specify a folder in the **Output To area**. This folder must be available for all the computers that are rendering.
4. In the **Render Queue** panel, select **Skip Existing Files (allow multi-machine rendering)** in the **Render Settings** section so that multiple computers do not render the same frames. Do not use multiple output modules for one render item when using skip existing files.
5. Save the project on the computer where you opened it in step 2.
6. On each computer that will be rendering, open and save the project. Saving the project ensures that After Effects records the new relative paths to each computer in the following step.

7 Unless the network can handle large file transfers rapidly, copy the project file and all its source footage to each rendering computer.

8 Open the **Render Queue** panel on each computer and click **Render**. You do not need to start rendering on each computer simultaneously, but to ensure equal workloads, start them at approximately the same time. As each computer finishes rendering a frame, After Effects searches the **Output** folder for the next unrendered frame and starts rendering again.

9 You can stop and start any computer at any time. However, if you stop a computer without starting it again, the frame that it was rendering may not be finished. If one or more computers stop during rendering, starting any one computer ensures that all frames in the sequence get rendered.

Run aerender in non-royalty bearing mode

After Effects CS5.5 had to be serialized on render-only machines due to licensing issues. In After Effects CS6 and later, you can now run aerender or use Watch Folder in a non-royalty bearing mode, so serialization not required.

To ensure that After Effects is running in non-royalty bearing mode, place a blank file named *ae_render_only_node.txt* into the following location:

1 Install After Effects on the render-only machine.

- Mac locations:

  /Users/<username>/Documents/

  /Users/Shared/Adobe/

- Windows locations:

  C:\\Users\\<username>\\Documents

  C:\\Users\\Public\\Documents\\Adobe

Segment settings

Segment settings are in the Output preferences category.

Choose Edit > Preferences > Output (Windows) or After Effects > Preferences > Output (Mac OS).

After Effects can render sequences and movie files into segments that are limited to a specified number of files or by file size. This is useful when preparing a movie for a medium such as CD-ROM, for which file or folder size may need to be limited to chunks of 650 MB or less. Use the Segment Video-only Movie Files At value to set the maximum size for segments in megabytes. Use the Segment Sequences At value to set the maximum number of still-image files in a folder.

If you are exporting a movie that is larger than the maximum file size for your hard disk formatting scheme, then you can set the Segment Video-only Movie Files At value to a value under this maximum. Hard disks formatted for Windows can be formatted using the FAT, FAT32, or NTFS scheme. The maximum file size in the FAT scheme is 2 GB, and the maximum file size in the FAT32 scheme is 4 GB. The maximum size for a file for NTFS is large (approximately 16 terabytes), so you are unlikely to reach this limit with a single movie.

Only movies that do not contain audio can be segmented. If an output module includes audio, the Segment Video-only Movie Files At preference is ignored for that item.

The Segment Sequences At preference is ignored for any render item for which Skip Existing Files is selected in the render settings. (See Render settings reference.)

Note:

After Effects won't render and export a segmented movie to the root directory (e.g., C:\). To render and export a segmented movie, choose an output directory other than the root directory. (See Specify filenames and locations for rendered output.)

Using the GoPro CineForm codec in After Effects

About the GoPro CineForm codec

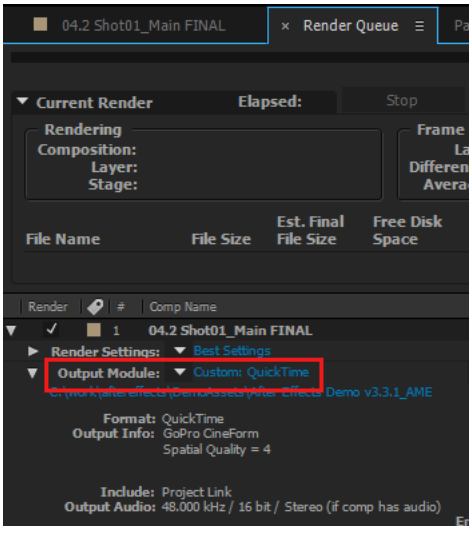
The GoPro CineForm codec is a cross-platform intermediate codec that is commonly used in film and television workflows that use HD or higher resolution media.

In the latest version of After Effects CC and Adobe Media Encoder CC, the GoPro CineForm codec can be used to natively decode and encode QuickTime files (*.mov*). Hence you do not need to install additional codecs to create and use QuickTime files.

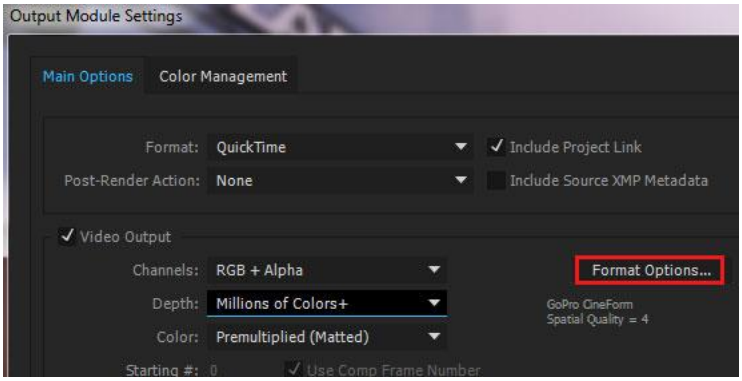
GoPro CineForm codec settings

There are five compression quality settings and two pixel format settings that you can use to adjust your output when using the GoPro CineForm codec. To export your After Effects projects with the GoPro CineForm codec, do the following:

1 Select a project in the Render Queue and click the Output Module setting.

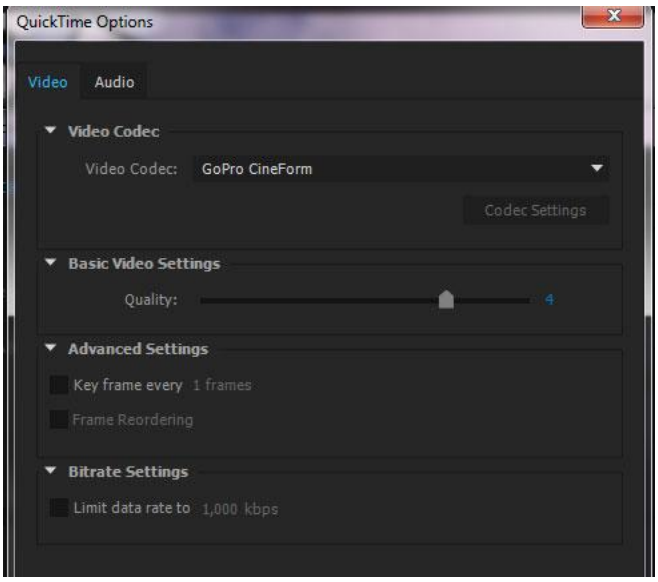


2 Choose QuickTime as the output format in the **Format** drop-down list and click **Format Options**.



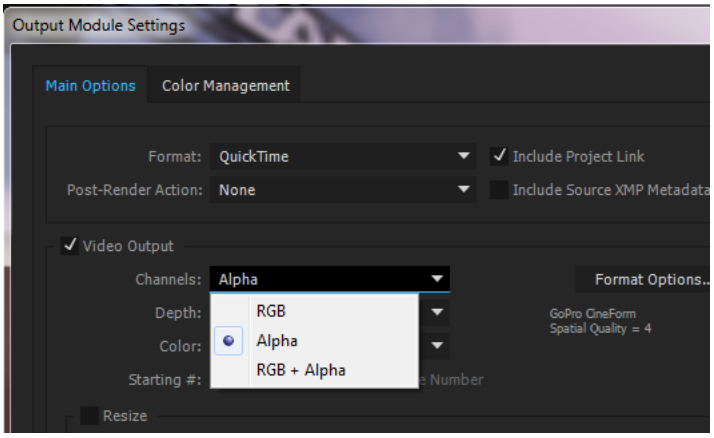
3 Choose GoPro CineForm as the video codec in the QuickTime Options dialog box. Adjust the compression settings using the Quality slider under the Basic Video Settings. The slider can be moved from a range of 1 to 5, with 1 for the Low setting and 5 for Film Scan 2 setting. The default value is 4 (Film Scan).

1. Low
2. Medium
3. High
4. Film Scan
5. Film Scan 2



See the Understanding CineForm Quality settings article on the CineForm website for detailed information about this setting.

4 The GoPro CineForm codec can encode pixels in YUV 4:2:2 at 10 bits per channel, or RGBA 4:4:4:4 at 12 bits per channel.



The encoded pixel format is based on the color depth and alpha channel settings that you choose in the **Output Module Settings** dialog box. There are three Channels settings that can be set, RGB, Alpha, and RGB+Alpha:

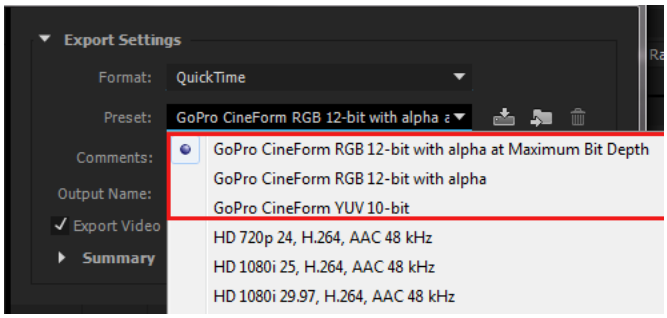
- Set **Channels** to **RGB** or **Alpha** to encode to 10bpc YUV. In this case, **Depth** can only be set to **Millions Of Colors**.
- Set **Channels** to RGB+Alpha to encode to 12bpc RGBA. In this case **Depth** can be set to **Millions of Colors+** or **Trillions of Colors+**.

Note:

*After Effects renders the composition at the color depth specified in the **Project** and **Render Settings**, and the GoPro CineForm encoder will resample the frames to 10-bit YUV or 12 bpc RGBA as appropriate.*

5 Click Render in the Render Panel to begin rendering your project with the GoPro CineForm settings.

GoPro CineForm settings in Adobe Media Encoder


Export Settings
Format: QuickTime
Preset: GoPro CineForm RGB 12-bit with alpha
Comments:
Output Name:
Export Video
Summary
GoPro CineForm RGB 12-bit with alpha at Maximum Bit Depth
GoPro CineForm RGB 12-bit with alpha
GoPro CineForm YUV 10-bit
HD 720p 24, H.264, AAC 48 kHz
HD 1080i 25, H.264, AAC 48 kHz
HD 1080i 29.97, H.264, AAC 48 kHz

When you want to output to QuickTime format in Adobe Media Encoder using the GoPro CineForm encoder, there are three presets that you can use in the **Export Settings** dialog box:

1 GoPro CineForm RGB 12-bit with alpha at Maximum Bit Depth

2 GoPro CineForm RGB 12-bit with alpha

3 GoPro CineForm YUV 10-bit

Note:

The frames may be rendered at a higher or lower quality by Adobe Media Encoder, depending on the sources in use and whether the Maximum Bit Depth option is enabled. The GoPro CineForm encoder will resample the frames to 10 bpc YUV or 12 bpc RGBA as appropriate.

Other considerations

- You can edit the basic video settings, such as **Frame Rate** and **Aspect** ratio by unchecking the boxes next to each of these settings. For unsupported sizes such as GoPro 2.7K, change the resolution settings and down-scale to 1080,2K, or 4K or upscale to 6K.
- Due to the frame size limitations, frame width sizes should be divisible by 16, and frame height sizes should be divisible by 8, regardless of bit depth. For example, the frame size of GoPro 2.7 is 2704x1524 and hence this is currently not supported as its width of 1524 results in a partial frame size of 95.25.

Chapter 15: Expressions and automation

Expression basics

When you want to create and link complex animations, but want to avoid creating tens or hundreds of keyframes by hand, try using expressions. An expression is a small piece of code, much like a script— that you can plug into your After Effects projects, that evaluates to a single value for a single layer property at a specific point in time. However, scripts tell an application to do something, an expression says that a property is something.

If this sounds complex, watch the following video to kickstart exploring expressions.

Video

Note:

Two sources of example expressions are the Expression Sampler template project (File > Browse Template Projects) and the animation presets in the Behaviors category (Animation > Browse Presets).

Use the expression

The expression language is based on the standard JavaScript language, but you do not need to know JavaScript to use expressions. You can create expressions by using the pick whip or by copying simple examples and modifying them to suit your needs.

To open the expression controls, pick the layer property you want to affect and hold *Option* on *Mac* or *Alt* on PC while you click the keyframe (stopwatch) icon. The expressions box displays, you can use it to write. edit expfll then see the expression options including a place to write or paste your expression. You can also use the pick whip tool to reference another layer for your expression. And you can enable or disable your expression here without having to delete it.

Let's look at an example of a common and simple expression known as wiggle.

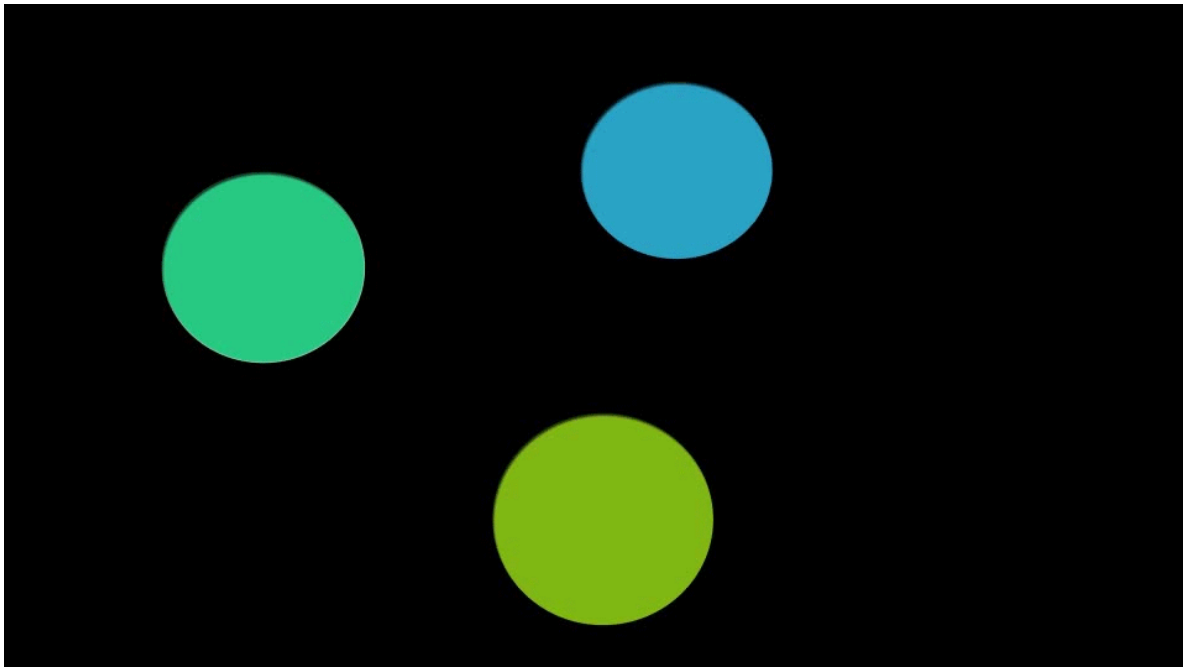
WIGGLE

If you want to layer to change positions randomly over time, you can change You could go into the position and set keyframes for different positions over the course of the timeline. You can also paste the below value in your timeline.

wiggle(10,20)

The first number represents the number of wiggles per second, and the second number represent the intensity or value of the wiggle.

Tip: For a quicker wiggle effect, set both the values high.



Wiggle

Animation presets can include expressions, or even consist entirely of an expression. Animation presets that use expressions instead of keyframes are sometimes called behaviors.

After you add an expression to a property, you can continue to add or edit keyframes for the property. An expression can take the value of a property as determined by its keyframes and use that as input to generate new, modified values. For example, the following expression on the Rotation property of a layer adds 90 degrees to the value of the Rotation property, in addition to the keyframed motion:

```
value + 90
```

Some methods—such as *wiggle*—operate directly on the keyframed property values. (See Property attributes and methods (expression reference).)

The following expression on the Position property of a layer preserves the keyframed motion of the layer and causes it to wiggle a little:

```
wiggle(10, 10)
```

Note:

Using the wiggle expression is often much faster and easier than using the Wiggler.

When you are animating text, you can use the Expression selector to specify how much you want an animator property to affect each text character. You can add one or more Expression selectors to an animator group, and that animator group can contain one or more properties.

While you are editing an expression, previews of all kinds are suspended; a red bar appears at the bottom of panels that are waiting for you to exit text-editing mode.

The values for a property that contains an expression appear in red or pink type.

A good way to begin working with expressions is to create a simple expression with the pick whip and then adjust the behavior of the expression using simple math operations, such as those listed in the following table:

Symbol	Function
+	Add
-	Subtract
/	Divide
*	Multiply
*-1	Perform opposite of original, such as counterclockwise instead of clockwise

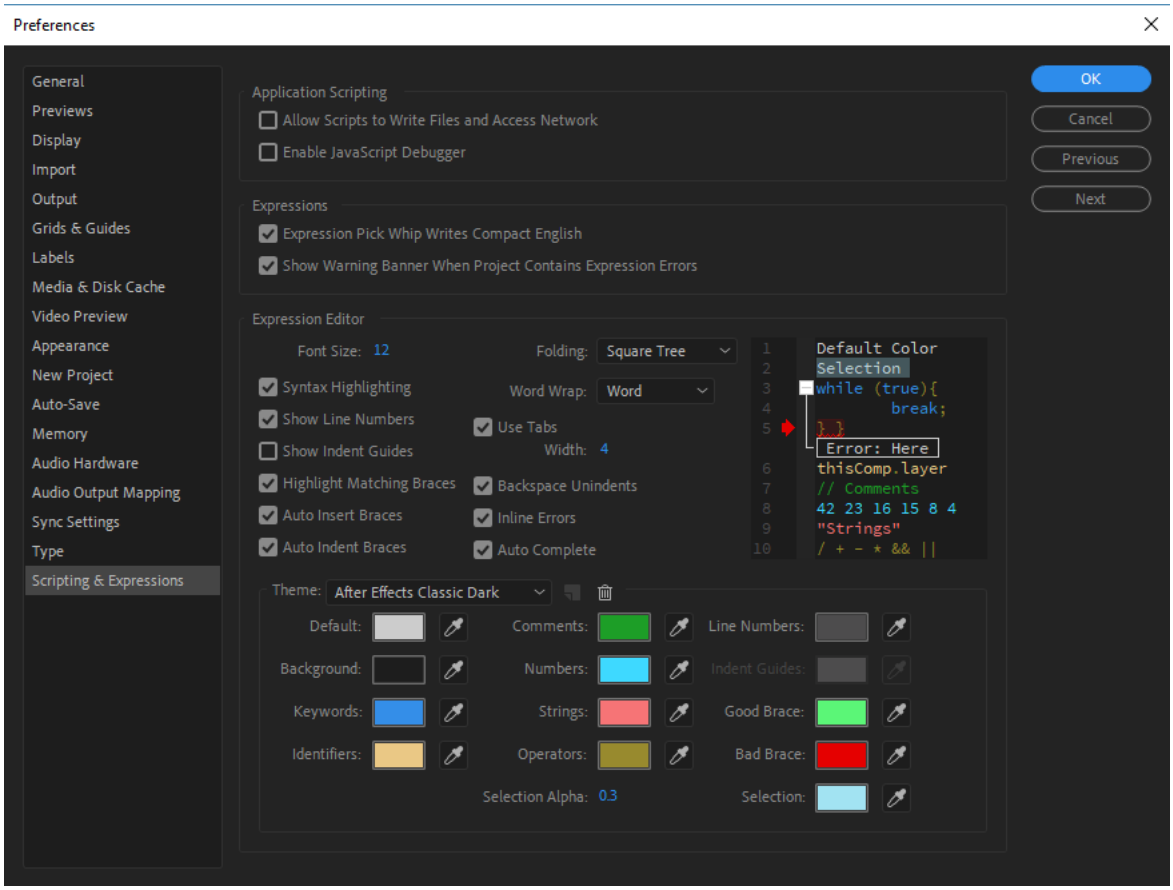
Note:

Replace the argument names written by the Expression Language menu with actual values.

Jeff Almasol provides a script that automatically processes expressions, making specified changes. For example, the script can be used to automatically remove or enable disabled expressions.

Expression Editor

You can customize the code editor interface of the expression editor, including highlighting JavaScript syntax with custom colors, line numbers, code folding, and auto-complete. To customize these options, select **Preferences** > **Scripting and Expressions**.



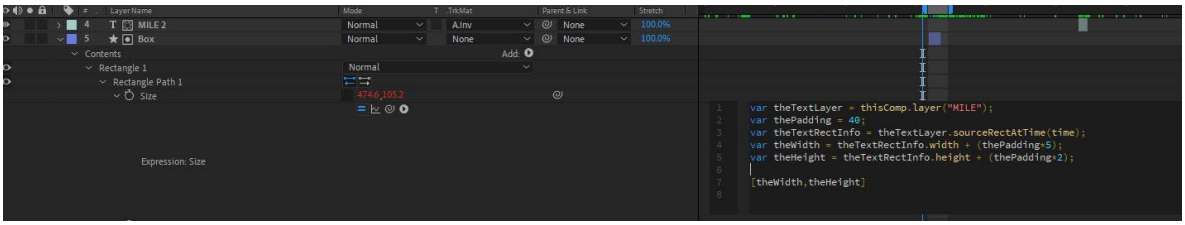
Scripting and Expressions dialog

See the example below to understand how the editor works:

Example 1: Display error in your code snippet.

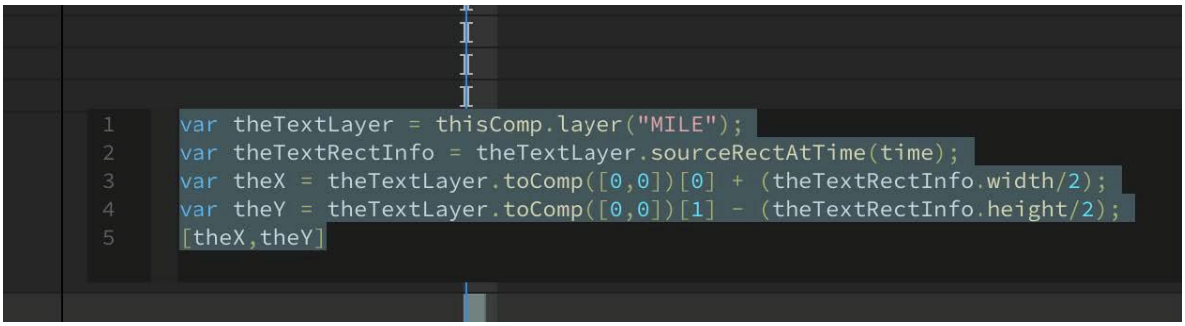
1 Open a comp in After Effects that has expression snippets.

2 In the **Timeline** panel, select a layer and do Alt+Click. It displays the expression in the expression editor field.



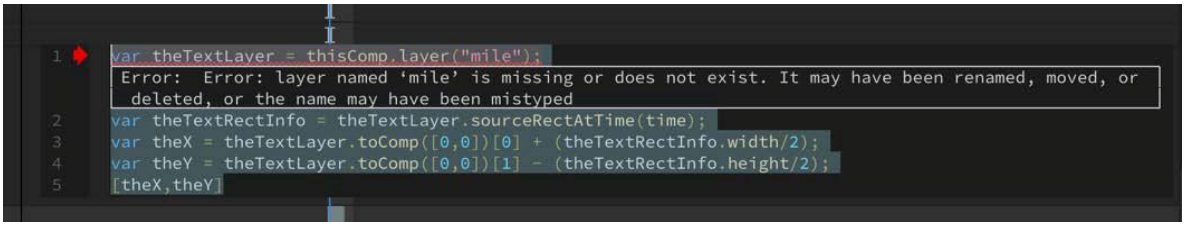
Expression Editor field

3 Click the editor field to enter the edit mode.


var theTextLayer = thisComp.layer("MILE");
var theTextRectInfo = theTextLayer.sourceRectAtTime(time);
var theX = theTextLayer.toComp([0,0])[0] + (theTextRectInfo.width/2);
var theY = theTextLayer.toComp([0,0])[1] - (theTextRectInfo.height/2);
[theX,theY]

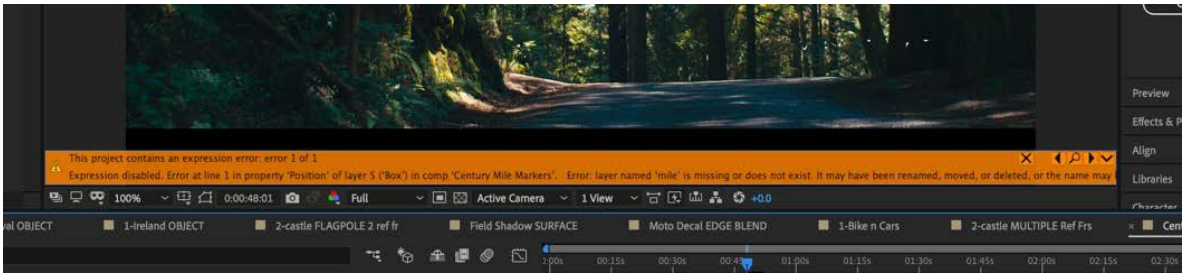
Click in the editor to enable editing in the Expression Editor

4 In this example, select **MILE**in the first line, and change it to **mile** in lowercase. This triggers an error in the code, and After Effects displays an error message within the code snippet.


var theTextLayer = thisComp.layer("mile");
Error: Error: layer named 'mile' is missing or does not exist. It may have been renamed, moved, or deleted, or the name may have been mistyped
var theTextRectInfo = theTextLayer.sourceRectAtTime(time);
var theX = theTextLayer.toComp([0,0])[0] + (theTextRectInfo.width/2);
var theY = theTextLayer.toComp([0,0])[1] - (theTextRectInfo.height/2);
[theX,theY]

Error message displayed in the code snippet

After Effects also displays an error banner with details about the Line number where the error occurs.

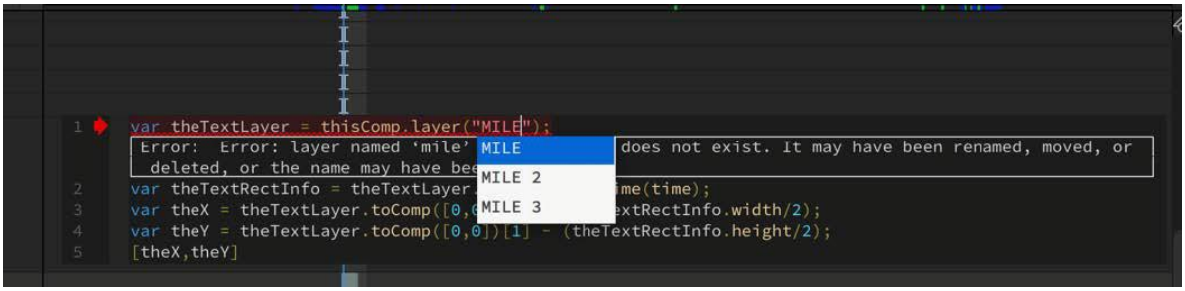

This project contains an expression error: error 1 of 1
Expression disabled. Error at line 1 in property 'Position' of layer 5 ('Box') in comp 'Century Mile Markers'. Error: layer named 'mile' is missing or does not exist. It may have been renamed, moved, or deleted, or the name may
Preview
Libraries
Active Camera
1 View
1-Ireland OBJECT
2-castle FLAGPOLE 2 ref fr
Field Shadow SURFACE
Moto Decal EDGE BLEND
1-Bike n Cars
2-castle MULTIPLE Ref Frs

Error banner

Example 2: Auto-suggestions based on the commonly used components.

1 In the same expression, change the layer name from **mile** to **MILE**.

2 As you type, After Effects displays a drop-down list with a set of suggestions that After Effects pulls from the layer names of the project.


var theTextLayer = thisComp.layer("MILE");
Error: Error: layer named 'mile' does not exist. It may have been renamed, moved, or deleted, or the name may have be
MILE
MILE 2
MILE 3
var theTextRectInfo = theTextLayer
var theX = theTextLayer.toComp([0,0
var theY = theTextLayer.toComp([0,0])[1] - (theTextRectInfo.height/2);
[theX,theY]

Layer name auto-suggestions

Composition names, layer names, footage names, and effect names are all pulled into the autoComplete and shown in the correct context with their respective **comp()**, **layer()**, **footage()**, and **effect()** methods. This allows you to keep your expression active while referencing items in the project. You do not need to scroll the Timeline or open other panels to refer to properties or items using the pickwhip.

Add, disable, link, or remove an expression

- To add an expression to a property, select the property in the Timeline panel and choose Animation > Add Expression or press Alt+Shift+= (Windows) or Option+Shift+= (Mac OS); or Alt-click (Windows) or Option-click (Mac OS) the stopwatch button next to the property name in the Timeline panel or Effect Controls panel.
- To link a set of properties across layers and compositions, use property links. Select any one property or set of properties and choose Edit > Copy With Property Links or Edit > Copy With Relative Property Links, and then paste those properties on any layer in a composition. The pasted properties remain connected to the layer from which the properties were copied, such that any change made to the original property is reflected in all of the instances of the pasted property links. You can even copy an entire layer with property links and paste it to create duplicates that follow the changes made to the original.

  The command Copy With Relative Property Links, works like the command Copy With Property Links, except that the Copy With Relative Property Links command creates expressions that do not reference the source composition by name. This maintains a relative link between the layer with the expression and the composition containing that layer. This can be useful when, for example, you want to move expression-rigged layers from one composition to another but let the layers reference a control layer only in the same composition. The expressions created using the Copy With Relative Property Links command are identical to those created using the expression pick whip.

The result of copying a layer's Position property with the Copy With Relative Property Links command is as follows:

thisComp.layer("control_layer").transform.position

The result of copying a layer's Position property with the Copy With Property Links command is as follows, which specifically references the layer's source composition in the expression:

comp("source_comp").layer("control_layer").transform.position

- To temporarily disable an expression, click the Enable Expression switch . When an expression is disabled, a slash appears through the switch .
- To remove an expression from a property, select the property in the Timeline panel and choose Animation > Remove Expression, or Alt-click (Windows) or Option-click (Mac OS) the stopwatch button next to the property name in the Timeline panel or Effect Controls panel.

Edit an expression with the pick whip

If you are not familiar with JavaScript or the After Effects expression language, you can still take advantage of the power of expressions by using the pick whip. You simply drag the pick whip from one property to another to link the properties with an expression, and the expression text is entered in the expression field at the insertion point. If text is selected in the expression field, the new expression text replaces the selected text. If the insertion point is not in the expression field, the new expression text replaces all text in the field.

You can drag the pick whip to the name or value of a property. If you drag to the name of a property, the resulting expression displays all the values as one. For example, if you drag the pick whip to the name of the Position property, an expression like the following appears:

```
thisComp.layer("Layer 1").transform.position
```

If you drag the pick whip to one of the component values of the Position property (such as the y value), an expression like the following appears, in which both the x and y coordinates of the property are linked to the y value of the Position property:

```
temp = thisComp.layer("Layer 1").transform.position[1];
[temp, temp]
```

If the layer, mask, or effect that you drag the pick whip to does not have a unique name in its local context, After Effects renames it. For example, if you have two or more masks named "Mask" on the same layer, and you drag the pick whip to one of them, After Effects renames it "Mask 2."

The format of expressions created by the pick whip is determined by the Expression Pick Whip Writes Compact English preference (Edit > Preferences > General (Windows) or After Effects > Preferences > General (Mac OS)). By default, the pick whip creates compact English expressions, which use the names for properties as they appear in the Timeline panel for the properties within an expression. Because these names are coded into the application and never change, these expressions can work when After Effects is running in another language. Any property names that you can change are enclosed in double quotation marks and remain the same in any language. If you don't plan on sharing your projects across languages, you can deselect this preference. This preference does not affect effect names or effect properties.

Here is an example in compact English:

```
thisComp.layer("Layer 1").transform.position
```

Here is the same expression, not in compact English:

```
thisComp.layer("Layer 1")("Transform")("Position")
```

Note:

Because the default is to use compact English, this document uses compact English in most examples and illustrations.

1 Drag the pick whip to another property in the Timeline panel or Effect Controls panel.

2 Optionally, modify the default expression in the expression field.

Note:

If you use the pick whip to create an expression to refer to a layer, and that layer has the same name as another layer in the same composition, then the targeted layer's name changes. The new layer name is the old layer name with a numeral at the end. This change is necessary to ensure that the expression unambiguously refers to a single layer in the composition.

Edit an expression manually

1 Enter text-editing mode by clicking in the expression field.

Note:

When you enter text-editing mode, the entire expression is selected. To add to the expression, click within the expression to place the insertion point; otherwise, you will replace the entire expression.

2 Type and edit text in the expression field, optionally using the Expression Language menu.

To see more of a multiline expression, drag the bottom or top of the expression field to resize it.

3 To exit text-editing mode and activate the expression, do one of the following:

- Press Enter on the numeric keypad.
- Click outside the expression field.

Show expressions and the expression graph

In Graph Editor mode, the single expression field appears as a resizable box at the bottom of the Graph Editor and shows only the expression for the selected property. To show multiple expression fields simultaneously, the Timeline panel must be in layer bar mode.

To toggle between layer bar mode and Graph Editor mode, press Shift+F3.

- To show only properties with expressions, select one or more layers, and then press *EE*.
- To show the expression field in the Graph Editor, choose Show Expression Editor from the Choose Graph Type And Options menu at the bottom of the Graph Editor. When you add an expression to a property, the expression editor is shown, regardless of this setting.

To resize the expression field, drag its bottom edge up or down.

- To see how an expression changes the value or velocity graph, click the Show Post-Expression Graph button while showing the value or velocity graph in the Graph Editor.

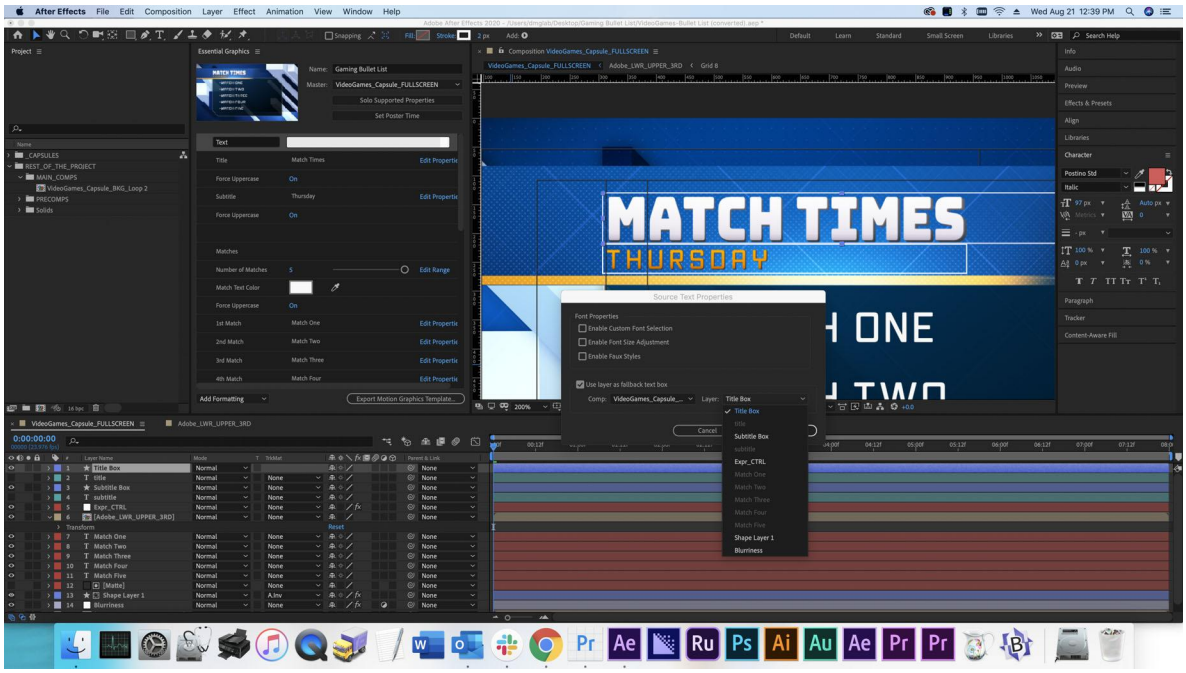
The dimly colored graph displays the value or velocity before the expression is applied, and the brightly colored graph displays the value or velocity after the expression is applied. Turning on the graph overlay for the Position property also changes the motion path display in the Composition panel so that you can see the expression-affected path.

You can use the search field in the Timeline panel to search expressions as well as other components of a property. If the search string appears in an expression, the property and its containing property groups and layer are shown in the filtered set of search results.

Write expressions for source text

The Source Text property of a text layer is interpreted by expressions as a JavaScript String. You can use the pick whip to retrieve the source text from another text layer; however, only the style of the first character of the destination layer is used.

In the Essential Graphics Panel, in the Source Text Properties menu, you can select the **Use layer as fallback text box**. When checked on, you can select a comp/subcomp and a shape or clip layer to determine an alternate text box for editing the text in Premiere Pro Program Monitor.



For more information on the JavaScript String object, consult a JavaScript reference resource.

You can use "\r" in a string expression to start a new line of text. For example, to copy the original text from one layer onto the same layer and repeat it in all uppercase characters on a new line, use the following expression:

```
text.sourceText + "\r" + text.sourceText.toUpperCase()
```

Adding a text layer to a composition and adding an expression to its Source Text property can be a great way to examine the property values of other layers. For example, the following expression on a Source Text property reports the name and value of the Opacity property for the next layer in the layer stacking order:

```
thisComp.layer(index + 1).name + "\rOpacity = " + thisComp.layer(index + 1).opacity.value
```

The following example reports the name of the footage item used as the source of the topmost image layer in the stacking order at the current time that has its Video switch set.

```
source_footage_name = "";
for (i = 1; i <= thisComp.numLayers; i++){
    if (i == index) continue;
    my_layer = thisComp.layer(i);
    if (! (my_layer.hasVideo && my_layer.active)) continue;
    if (time >= my_layer.inPoint && time < my_layer.outPoint){
        try{
            source_footage_name = my_layer.source.name;
        }catch(err1){
            source_footage_name = my_layer.name
        }
        break;
    }
}
source_footage_name
```

Aharon Rabinowitz provides a video tutorial and example expressions on Red Giant TV that show how to animate a video game score with the Source Text property and a Slider effect (an Expression Controls effect).

Access and edit text properties with expressions

You can use expressions to control text styling as well as the text itself. Work with any text expression as well as with Motion Graphics Templates. You can link multiple titles together and update their styling at once, which is used for title design, especially main and end titles.

For more information, see Use expressions to edit and access text properties.

Add comments to an expression

If you write a complex expression and intend for you or someone else to use it later, you should add comments that explain what the expression does and how its pieces work.

- Type // at the beginning of the comment. Any text between // and the end of the line is ignored. For example: *// This is a comment.*

  For examples of this type of comment, see Expression example: Fade opacity of a 3D layer based on distance from camera.

- Type /* at the beginning of the comment and */ at the end of the comment. Any text between /* and */ is ignored. For example: */* *This is a multiline comment.* */*

  For examples of this type of comment, see Save and reuse expressions.

Save and reuse expressions

Once you have written an expression, you can save it for future use by copying and pasting it into a text-editing application or by saving it in an animation preset or template project. However, because expressions are written in relation to other layers in a project and may use specific layer names, you must sometimes modify an expression to transfer it between projects.

You can define your own functions within expressions using normal JavaScript function syntax. In this example, a function is defined that calculates the average of two values, and the last line uses this function:

```
function average(a, b)
{
  return (a + b) / 2;
}
average(position, thisComp.layer(1).position);
```

Note:

You must define each function fully within each expression in which it is used. There is no global library of functions that you can add to.

If you want to save an expression for use in another project, you should add comments to the expression. (See Add comments to an expression.) You should also use variables so that you can change a value in one place rather than having to change it in several places.

For example, this expression has a multiline comment at the beginning that explains what the expression does and a short comment after a variable is declared and initialized that tells what the variable is for:

```
/*  This expression on a Source Text property reports the name
    of a layer and the value of its Opacity property. */

var myLayerIndex = 1; // layer to inspect, initialized to 1, for top layer

thisComp.layer(myLayerIndex).name + ": \rOpacity = " +
thisComp.layer(myLayerIndex).opacity.value
```

You can save an animation preset that includes an expression and reuse it in other projects, as long as the expression does not refer to properties that don't exist in the other projects. When you save a preset in which a property has an expression but no keyframes, only the expression is saved. If the property has one or more keyframes, the saved preset contains the expression along with all keyframe values.

You can copy an expression from a layer property, with or without the keyframes for the property.

- To copy an expression and keyframes from one property to other properties, select the source layer property in the Timeline panel, copy the layer property, select the target layer properties, and paste.
- To copy an expression from one property to other properties without copying keyframes, select the source property, choose Edit > Copy Expression Only, select the target properties, and paste.

Copying an expression without keyframes is useful when you want to simultaneously copy multiple expressions and paste them onto one or more new layers, or when you want to copy one expression and paste it onto more than one layer.

Note:

As with pasting keyframes and other items, you can often paste the item into the target layer and rely on After Effects to determine which property should be the target of the paste operation. For example, this works for copying Position properties from one layer to another, but you must select the target property yourself if you are pasting an expression from a Position property into a Scale property.

Use an Expression Controls effect to add a control that you can use to manipulate the values of one or many properties by linking the property to the control using expressions. A single control can affect several properties at once.

You can use them to control other parameters using expressions. You can add a slider that moves a layer only within certain limits, or let the user select between several options by dragging a slider. You can add check boxes that turn layers on or off, or change color schemes on text and graphics layers. You can add angle controls that drive the rotation of several layers, and you can add color controls that change the color of text, glows, or shapes. There are seven types of Expression Controls in After Effects, but the 3D Point Control and the Layer Control are not supported by the Essential Graphics panel, so they're not used for MOGRT design.

The names for the Expression Control effects indicate what type of property control they provide: Angle Control, Check box Control, Color Control, Layer Control, Point Control, Slider Control, and Dropdown Menu Control. After Effects CS5.5 and later includes a 3D Point Control, as well.

If you apply an animation preset from the Animation Presets > Shapes > Backgrounds category, you can see a custom Animated Shape Control effect in the Effect Controls panel. This custom effect is a specialized expression control effect that was created specifically for these animation presets. You can copy and paste this effect to other layers, or you can save it as an animation preset itself so that you can apply it elsewhere.

You apply Expression Controls effects to a layer in the same ways that you apply other effects, such as dragging the effect onto the layer from the Effects & Presets panel.

You can apply Expression Controls effects to any layer; however, it is useful to apply them to a null layer, which you can simply use as a controlling layer. You then add expressions to properties on other layers to take input from that control. For example, you can add the Slider Control effect to a null layer (Null 1), and then apply this expression to the Position properties of multiple layers:

```
position+[0,10*(index-1)*thisComp.layer("Null 1").effect("Slider Control")("Slider")]
```

In this example, as you drag the slider, each layer with this expression moves. The layers with greater index numbers (layers toward the bottom in the Timeline panel) are shifted more than the layers with lower index numbers, at 10-pixel intervals. You can set keyframes for the slider on the null layer, and all the other layers animate accordingly.

It is often useful to rename each instance of an Expression Control effect to indicate its use. For example, renaming an instance of the Color Control effect to sky color makes it easier to tell what the effect is controlling. You can rename each instance of an Expression Control effect just as you rename any other effect: select it in the Timeline panel or Effect Controls panel and press Enter on the main keyboard (Windows) or Return (Mac OS).

To modify the range of a control, right-click (Windows) or Control-click (Mac OS) the underlined property value for the control and choose Edit Value from the context menu.

Convert an expression to keyframes

In some situations, it's useful to convert an expression to keyframes. For example, if you want to freeze the values in an expression, you can convert the expression to keyframes and then adjust the keyframes accordingly. If an expression takes a long time to evaluate, you can convert it to keyframes so that it renders more quickly. When you convert an expression to keyframes, After Effects evaluates the expression, creating a keyframe at every frame, and then disables the expression.

? In the Timeline panel, select the property on which the expression is written and choose Animation > Keyframe Assistant > Convert Expression To Keyframes.

The After Effects expression language is based on JavaScript 1.2, with an extended set of built-in objects. After Effects uses only the core standard JavaScript 1.2 language, not the web browser–specific extensions. After Effects contains its own set of extension objects—such as Layer, Comp, Footage, and Camera—that you can use to get most of the values in an After Effects project.

Though the expression language is based on a scripting language, a subtle but important difference exists between a script and an expression: Whereas a script tells an application to *do* something, an expression says that a property *is* something.

For more information about JavaScript, see a JavaScript reference resource.

When creating expressions, keep in mind the following:

- The value of an expression is the value of the last statement evaluated.
- JavaScript is a case-sensitive language.
- Semicolons are required to separate statements or lines.
- Spaces between words are ignored, except within a string.

In JavaScript, a value stored in an object is called a property. However, After Effects uses the term property to refer to layer components as defined in the Timeline panel. For this reason, After Effects refers to JavaScript properties as either methods or attributes. In general practice, the difference between a method and an attribute is that a method usually does something to create its output (return) value, whereas an attribute simply refers to an existing value to determine its output (return) value. You can tell a method from an attribute most easily by looking for the parentheses following the method name, which surrounds any input arguments to the method.

An object is an item that can contain other objects, attributes, and methods. Compositions, layers, and footage items are examples of objects. Specifically, compositions, layers, and footage items are global objects, which means that they can be referred to in any context without reference to some higher-level object.

Accessing attributes and methods

You use the expression language to access attributes and methods of layer properties. To access a value, use a chain of object references separated by the period (.) operator. To chain object references past the layer level (for example, to refer to effect properties, masks, or text animators), you can also use parentheses. For example, to link the Opacity property in Layer A to the Blurriness property of the Gaussian Blur effect in Layer B, enter the following expression in the expression field for the Opacity property for Layer A:

```
thisComp.layer("Layer B").effect("Gaussian Blur")("Blurriness")
```

Reading this expression from left to right, you progress from the higher-level, containing object down to the specific property:

- The global object used refers to the current composition: *thisComp*.
- A specific layer object within that composition is referred to by its name: *layer("Layer B")*.
- A specific effect object within that layer is referred to by its name: *effect("Gaussian Blur")*.
- A specific effect property within that effect is referred to by its name: *("Blurriness")*.

For the *n*th component of a multidimensional property, like the y component of an effect control point, append [*n*] at the end, like this:

```
thisComp.layer("Layer B").effect("Advanced Lightning")("Origin")[1]
```

The default object for an expression is the property on which the expression is written, followed by the layer containing the expression; therefore, you do not need to specify the property. For example, a wiggle expression written on the Position property of a layer can be either of the following:

```
wiggle(5, 10)
position.wiggle(5, 10)
```

Include the layer and property when retrieving them from outside the layer and property on which the expression is written. For example, an expression written on the Opacity property of Layer B, linking it to the Rotation property of Layer A would look like this expression:

```
thisComp.layer("Layer A").rotation
```

To see more examples of how expressions work, use the pick whip to link one layer property to another, and look at the expressions it creates.

Jeff Almasol provides a script on his redefinery website with which you can determine how to refer to any property in expressions.

Arrays and multidimensional properties

An *Array* is a type of object that stores an ordered set of numbers. An Array is represented as a list of numbers separated by commas and surrounded by brackets, as in this example:

```
[10, 23]
```

You can assign an Array object to a variable, making it easy to refer to array values in other areas of the expression. For example:

```
myArray = [10, 23]
```

The *dimension* of an Array object is the number of elements in the array. The dimension of *myArray* is 2. Different properties in After Effects have different dimensions depending on the number of value arguments they have. In the expression language, the values of properties are either single values (Number objects) or arrays (Array objects).

The following table provides examples of some properties and their dimensions:

Dimension	Property
1	Rotation ° Opacity %
2	Scale [x=width, y=height] Position [x, y] Anchor Point [x, y] Audio Levels [left, right]
3	Scale [width, height, depth] 3D Position [x, y, z] 3D Anchor Point [x, y, z] Orientation [x, y, z]
4	Color [red, green, blue, alpha]

You can access the individual elements of an Array object by using brackets and an index number to indicate which element you want. The elements in an Array object are indexed starting from 0. Using the previous example, *myArray[0]* is *10* and *myArray[1]* is *23*.

The following two expressions are equivalent:

```
[myArray[0], 5]
[10, 5]
```

The Position property arrays are indexed as follows:

- *position[0]* is the x coordinate of position.
- *position[1]* is the y coordinate of position.
- *position[2]* is the z coordinate of position.

Colors are represented as four-dimensional arrays [red, green, blue, alpha]. In projects with a color depth of 8 bpc or 16 bpc, each value in a color array ranges from 0 (black) to 1 (white). For example, red can range from 0 (no color) to 1 (red). So, [0,0,0,0] is black and transparent, and [1,1,1,1] is white and opaque. In projects with a color depth of 32 bpc, values under 0 and over 1 are allowed.

If you use an index that is greater than the index of the highest-dimension component in an Array object, After Effects returns an error. For example, *myArray[2]* causes an error, but *position[2]* returns the z coordinate of Position.

Many of the properties and methods in the After Effects expression language take Array objects as arguments or return them as values. For example, *thisLayer.position* is an Array object that is either two-dimensional or three-dimensional depending on whether the layer is 2D or 3D.

If you want to write an expression that keeps the y value of an animation of Position but fixes the x value at 9, you would use the following:

```
y = position[1];
[9,y]
```

The following is even more succinct:

```
[9, position[1]]
```

This is an important point, so let's look at one more example. If you want to combine the x position value from Layer A with the y position value from Layer B, you would use the following:

```
x = thisComp.layer("Layer A").position[0];
y = thisComp.layer("Layer B").position[1];
[x,y]
```

You can create an expression that refers to just one value within the array of a 2D or 3D property. By default, the first value is used, unless you specify otherwise. For example, if you drag the pick whip from the Rotation property of Layer A to Scale property of Layer B, the following expression appears:

```
thisComp.layer("Layer B").scale[0]
```

By default, this expression uses the first value of the Scale property, which is width. If you prefer to use the height value instead, drag the pick whip directly to the second value instead of the property name, or change the expression as follows:

```
thisComp.layer("Layer B").scale[1]
```

Conversely, if you drag the pick whip from the Scale property of Layer B to the Rotation property of Layer A, After Effects automatically creates a variable, assigns the one-dimensional Rotation property value to it, and then uses that variable for both dimensions of the Scale property:

```
temp = thisComp.layer(1).transform.rotation;
[temp, temp]
```

Vectors

In After Effects, many properties and methods take or return *vectors*. After Effects refers to an array as a *vector* if it represents either a point or direction in space. For example, After Effects describes *position* as returning a vector.

However, though a function like *audioLevels* does return a two-dimensional value (the left and right channel levels), it is not called a *vector* because it does not represent a point or direction. Some functions in After Effects accept vector arguments, but they are generally only useful when the values passed represent a direction. For example, *cross(vec1, vec2)* computes a third vector that is at right angles to the input vectors. The cross product is useful when *vec1* and *vec2* are two vectors representing directions in space, but not if they just represent two arbitrary collections of numbers.

Indices and labels

Indexing for Layer, Effect, and Mask elements in After Effects starts from 1. For example, the first layer in the Timeline panel is *layer(1)*.

Generally, it is best to use the name of a layer, effect, or a mask instead of a number to avoid confusion and errors if the layer, effect, or mask is moved, or if the arguments are changed during product updates and upgrades. When you use a name, always enclose it in straight quotes. For example, the first of these expressions is easier to understand than the second expression, and the first expression continues to work even if you change the order of effects:

```
effect("Colorama").param("Get Phase From")
effect(1).param(2)
```

Expression time

Time within an expression is always in composition time (not layer time) and is measured in seconds. The default time for any expression is the current composition time at which the expression is being evaluated. The following expressions both use the default composition time and return the same values:

```
thisComp.layer(1).position
thisComp.layer(1).position.valueAtTime(time)
```

To use a relative time, add an incremental time value to the *time* argument. For example, to get the Position value 5 seconds before the current time, use the following expression:

```
thisComp.layer(1).position.valueAtTime(time-5)
```

Default time references to properties in nested compositions use the original default composition time, not remapped time. However, if you use the *source* function to retrieve a property, the remapped time is used.

For example, if the source of a layer in the containing composition is a nested composition, and in the containing composition you have remapped time, when you get the position values of a layer in the nested composition with the following expression, the position values use the default time of the composition:

```
comp("nested composition").layer(1).position
```

However, if you access layer 1 using the *source* function, the position values use the remapped time:

```
thisComp.layer("nested composition").source.layer(1).position
```

Note:

If you use a specific time in an expression, After Effects ignores the remapped time.

Because expressions operate on time in units of seconds (not frames), you sometimes need to use time conversion methods to convert time values to perform operations on frames. (See Time conversion methods (expression reference).)

Expression errors

When an expression fails to evaluate, expression errors appear in a warning banner at the bottom of the Composition and Layer panels. After Effects does not disable the expression but continues to evaluate it. The warning banner is displayed as long as the expression fails to evaluate; that is, until the expression is either fixed or manually disabled.

Here's an example of what the expression error warning banner looks like:

An example expression error
***A** Left or Right arrow buttons **B** The Reveal Expression **C** The Expand/Collapse Warning*

- The Left or Right arrow buttons display the previous or next expression error when multiple expressions fail to evaluate.
- The Reveal Expression (magnifying glass) button exposes the property with the failing expression in the Timeline panel. If the expression is in a different composition, that composition opens.
- The Expand/Collapse Warning (up/down arrows) button shows or hides the error text.

The expression error text is one line only, and is clipped to the width of the Composition panel.

To see the full expression error text:

Click ⚠ next to the expression. The complete error appears in a dialog box.

To hide the warning banner:

Choose After Effects (Mac OS) or Edit (Windows) > Preferences > General and disable Show Warning Banner When Project Contains Expressions Errors.

When this option is disabled, the warning banner remains hidden even when new expression errors occur.

Re-enable this option to view expression errors.

More Expression resources

Now that you have understood some of the concepts behind expressions, come to the community for some real-life examples, and to share your work.

You can also check out Dan Ebberts' excellent collection of example expressions and tutorials on his MotionScript website.

The AE Enhancers forum also provides many examples and much information about expressions, as well as scripts and animation presets.

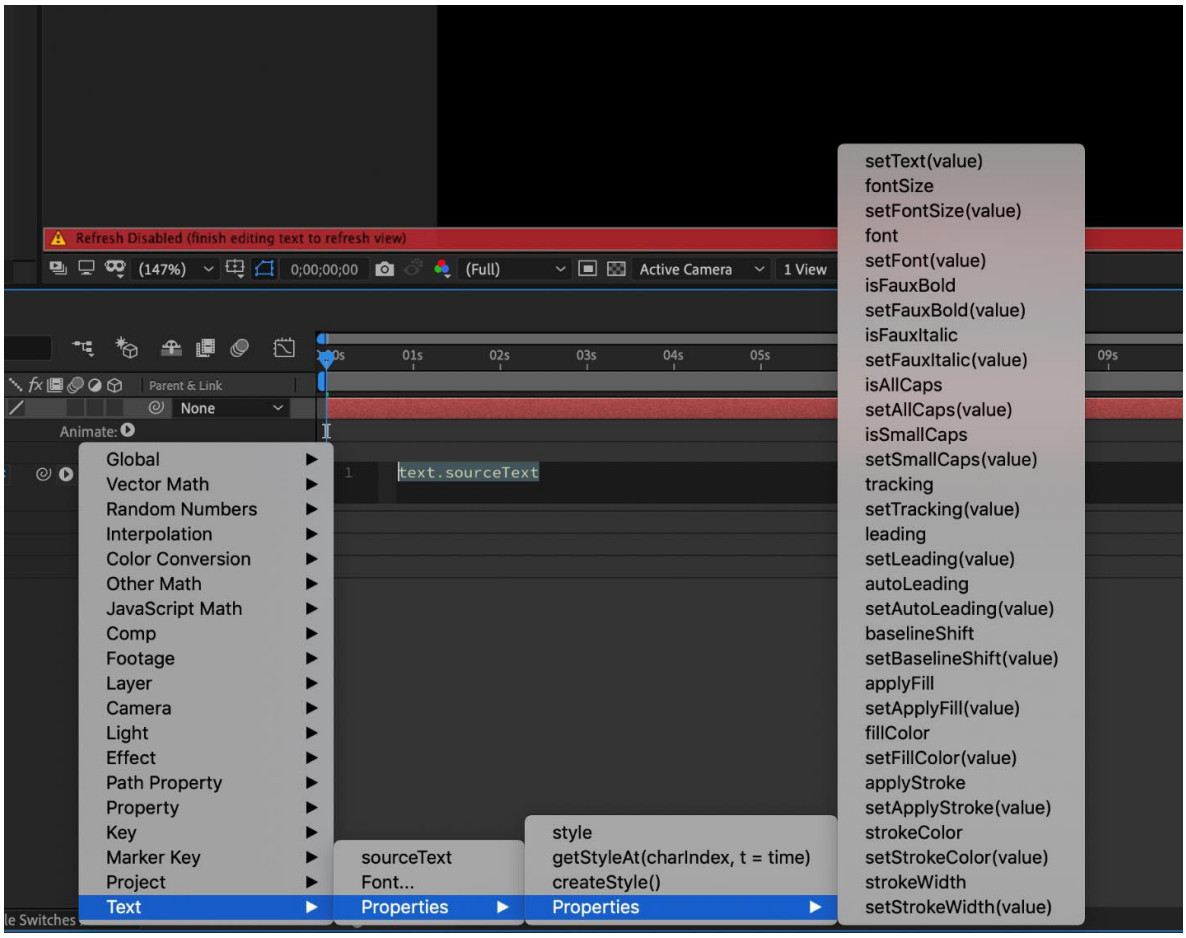
Use expressions to edit and access text properties

You can use expressions to control text styling as well as the text itself. Work with any text expression as well as with Motion Graphics Templates. You can link multiple titles together and update their styling at once, which is used for title design, especially main and end titles. You can make global changes to text properties when you use expressions.

This feature also enables you to keep font, size and styling in sync across multiple text layers in After Effects and Motion Graphics templates. Once you set these for a text layer, you can reference that layer properties to easily apply changes throughout the compositon.

After Effects uses the Get and Set functions to read and write values for text properties into the Expression Engine so that you can use expressions to drive and set font styles, such as text properties across text layers.

To access these functions for text properties, if expressions are enabled, right-click a text layer, and open the Expression menu, and select **Text** > **Properties** > **Properties**.



Access text properties

When you select a desired function, it adds to the expressions editor for that layer. If there is code already recorded in the expression editor, the new expression is inserted automatically.

Save these expressions as presets

Select the text layer with expressions added to it. Then, select **Animation** > **Save Animation Preset** to reuse the expressions in other projects. Animation Presets are saved in the **Effects and Presets** panel.

PostScript font expression menu

- To refer to specific fonts in an expression, you can use the **Font** dropdown menu in the **Expressions** menu to insert the PostScript name of the desired font into the expression.
- Select **Text** > **Font** in the **Expressions Editor** to insert into your expressions.

Other important points

- Fonts that are referred to in the expressions only are not recorded as Fonts Used by the project and therefore do not Auto-Sync or populate the Resolve Fonts Dialog if the font is not installed.
- The Workaround is to use all of the fonts referred to in the project on a layer or a comp even if that source is hidden. The reference to the font cannot only exist in the Expressions Editor.

The following are examples for how to access and use text property values with expressions:

Action	Expression
To return the value of the Font name for the same layer itself	style = text.sourceText.style.font;
To return the value of the Font name for another layer	fontName = thisComp.layer("source layer name").text.sourceText.style.font;
To return value of Font Size for the same layer itself	fontSize = text.sourceText.style.fontSize;
To return the value of Font Size for another layer	style = thisComp.layer("source layer name").text.sourceText.style.fontSize;
To return a boolean value of whether a layer's text is Faux Bold or not (True or False)	style = thisComp.layer("source layer name").text.sourceText.style.isFauxBold;
To return a boolean value of whether a layer's text is Faux Italic or not (True or False)	style = thisComp.layer("source layer name").text.sourceText.style.isFauxItalic;
To return a boolean value of whether a layer's text has Fill applied to it (true or false)	style.applyFill;
To return the value of the fill color of a text layer. By default this returns the first value of RGB on a scale from 0-1.0 To get the value for G or B add 1 or 2 in parenthesis at the end of expression	style.fillColor; style.fillColor(2);
To return a boolean value of whether a layer's text has Stroke applied to it (true or false)	style.applyStroke;
To return the value of the fill color of a text layer. By default this returns the first value of RGB on a scale from 0-1.0 To get the value for G or B add 1 or 2 in parenthesis	style.strokeColor; style.strokeColor(1);
To return the value of a text layer's Stroke	style.strokeWidth;
To return tracking value	style.tracking;
To return leading value	style.leading;
To return boolean value if auto leading is on or off (true or false)	style.autoLeading;
Get Function to return the value at a particular Character Index	getStyleAt(0);
Get Function to return the value at particular Character Index at Time (n = character index, x = time in seconds)	getStyleAt(n,x);
Example: To return the value at a particular Character Index and time (optional) same layer (n = character index, x = time in seconds)	style = text.sourceText.getStyleAt(n,x);
Get style at Character Index 0 of another layer	style = thisComp.layer("source layer name").text.sourceText.style; style;
Example: To return the value at a particular Character Index and time (optional) of a different layer different layer	style = thisComp.layer("source layer name").text.sourceText.getStyleAt(0,5);

Using .style at the end is the same as using getStyleAt(0);	style = text.sourceText.style;
Add "font or "fontStyle" after the getStyleAt(0) to return specific text property values	getStyleAt(4).fontSize; getStyleAt(3).font;

To return the values of both the style and the actual source text at time (short hand)	style = thisComp.layer("source layer name").text.sourceText.getStyleAt(0,0);
	or
	style.setText(thisComp.layer("source layer name").text.sourceText);

Set Functions for both style and text (long form):	style.setFont(thisComp.layer("source layer name").text.sourceText.style.font); style;
To create empty style (in order to use Set Functions to bake in specific values)	style = text.sourceText.createStyle();
create style and set specific values through Set Functions ** (long form):	styleA = thisComp.layer("source layer name").text.sourceText.createStyle(); styleB = styleA.setFontSize(300); styleC = styleB.setFont("Impact"); styleC;
create style and set specific values through Set Functions ** (short form):	text.sourceText.createStyle().setFontSize(300).setFont("Impact");
Returning Character Index value with Get Function + overriding some of the specific values with Set Functions	style = text.sourceText.getStyleAt(3); style = style.setFontSize(150); style = style.setFont(thisComp.layer("source later text").text.sourceText.style.font); style;
You can also reference layers by index instead of name for localization (but re-arranging or adding new layers will break the expression.	style = thisComp.layer(1).text.sourceText.getStyleAt(0); style.setText(thisComp.layer(1).text.sourceText);

Additional Set Functions that can be used individually or in combination with one another to drive styles across layers.	newStyle = style.setBaselineShift(new_value);
	newStyle = style.setApplyFill(true/false);
	newStyle = style.setFillColor([1.0,1.0,1.0]) // array of RGB values
	newStyle = style.setApplyStroke(true/false)
	newStyle = style.setStrokeColor([1.0,1.0,1.0]) // array of RGB values
	newStyle = style.setStrokeWidth(new_value)
	newStyle = style.setTracking(new_value);
	newStyle = style.setLeadig(new_value);
	newStyle = style.setAutoLeading(true);

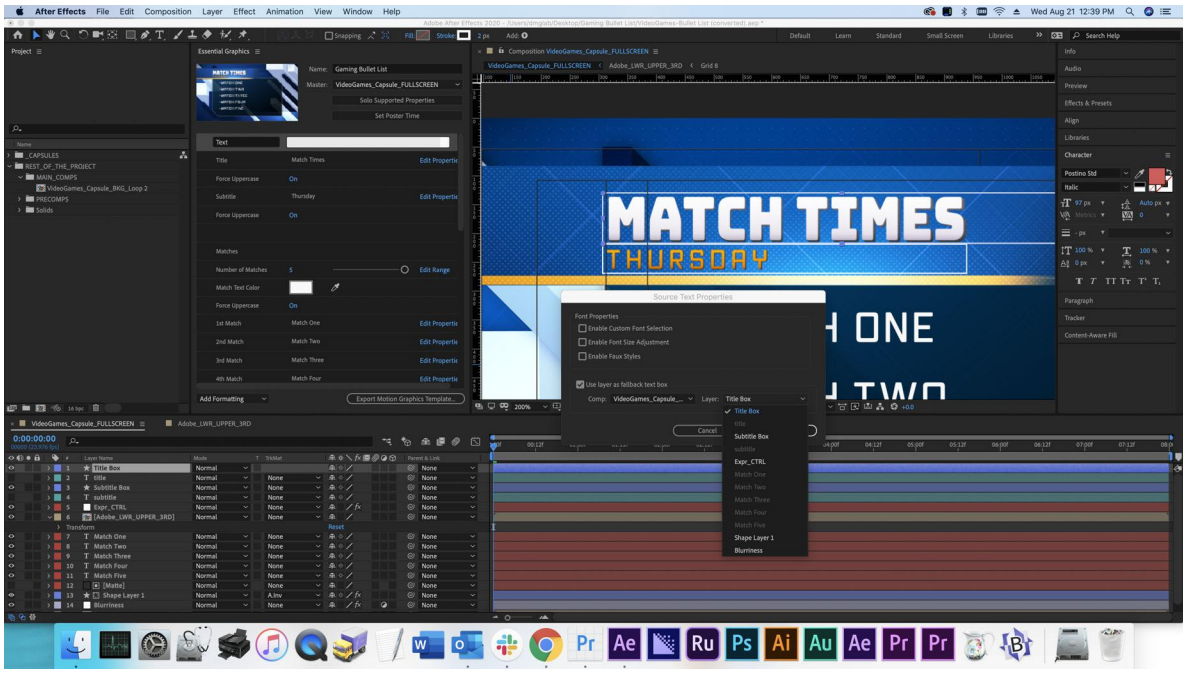
Set the Baseline Shift Value for a text layer	newStyle = style.setBaselineShift(new_value);
Use this to turn a text layer's Fill on or off	newStyle = style.setApplyFill(true/false);
Use this in combination with setApplyFill to define the Fill Color. These values are defined on a 0-1.0 RGB You can use this in combination with the hexToRGB to define the color values with Hex values instead of the 0-1.0 RGB scale	newStyle = style.setFillColor([1.0,1.0,1.0]) // array of RGB values
Use this to turn a text layer's Stroke on or off	newStyle = style.setApplyStroke(true/false)
Use this in combination with setApplyStroke to define the Stroke Color. These values are defined on a 0-1.0 RGB You can use this in combination with the hexToRGB to define the color values with Hex values instead of the 0-1.0 RGB scale	newStyle = style.setStrokeColor([1.0,1.0,1.0]) // array of RGB values
Use this to set a text layers stroke width	newStyle = style.setStrokeWidth(new_value)

Use this to set the Tracking value	newStyle = style.setTracking(new_value);
Use this to set the Leading Value	newStyle = style.setLeadig(new_value);
Use this to turn AutoLeading on or off	newStyle = style.setAutoLeading(true);
Example of how these can be used together	text.sourceText.style.setFillColor(hexToRgb("00FF00")).setApplyStroke(1).setStrokeWidth(5).setStrokeColor([1,0,0]).setFontSize(200);

Write expressions for source text

The Source Text property of a text layer is interpreted by expressions as a JavaScript String. You can use the pick whip to retrieve the source text from another text layer; however, only the style of the first character of the destination layer is used.

In the Essential Graphics Panel, in the Source Text Properties menu, you can select the **Use layer as fallback text box**. When checked on, you can select a comp/subcomp and a shape or clip layer to determine an alternate text box for editing the text in Premiere Pro Program Monitor.



You can use "\r" in a string expression to start a new line of text. For example, to copy the original text from one layer onto the same layer and repeat it in all uppercase characters on a new line, use the following expression:

```
text.sourceText + "\r" + text.sourceText.toUpperCase()
```

Adding a text layer to a composition and adding an expression to its Source Text property can be a great way to examine the property values of other layers. For example, the following expression on a Source Text property reports the name and value of the Opacity property for the next layer in the layer stacking order:

```
thisComp.layer(index + 1).name + "\rOpacity = " + thisComp.layer(index + 1).opacity.value
```

The following example reports the name of the footage item used as the source of the topmost image layer in the stacking order at the current time that has its Video switch set.

```
source_footage_name = "";
for (i = 1; i <= thisComp.numLayers; i++){
    if (i == index) continue;
    my_layer = thisComp.layer(i);
    if (! (my_layer.hasVideo && my_layer.active)) continue;
    if (time >= my_layer.inPoint && time < my_layer.outPoint){
        try{
            source_footage_name = my_layer.source.name;
        }catch(err1){
            source_footage_name = my_layer.name
        }
        break;
    }
}
source_footage_name
```

Expression language reference

Use the After Effects expression elements along with standard JavaScript elements to write your expressions. You can use the Expression Language menu at any time to insert methods and attributes into an expression, and you can use the pick whip at any time to insert properties.

If an argument description contains an equal sign (=) and a value (such as *t=time* or *width=.2*), then the argument uses the included default value if you don't specify a different value.

Some argument descriptions include a number in square brackets—this number indicates the dimension of the expected property or Array.

Some return-value descriptions include a number in square brackets—this number specifies the dimension of the returned property or Array. If a specific dimension is not included, the dimension of the returned Array depends on the dimension of the input.

The W3Schools JavaScript reference website provides information for the standard JavaScript language, including pages for the JavaScript *Math* and *String* objects.

Expressions: JavaScript Engine

After Effects uses JavaScript engine when evaluating expressions. The performance of evaluating expressions during renders can be up to 5x faster than the Legacy ExtendScript engine.

On Windows, After Effects uses the V8 open-source JavaScript engine. This provides a more modern version of JavaScript than available in ExtendScript, which only supports the 3rd Edition of the ECMA-262 Standard.

To choose whether a project uses the JavaScript engine or Legacy ExtendScript, in the **Project Settings** dialog, click the **Expressions** tab, and change the **Expressions Engine** option. Projects saved in previous versions of After Effects default to Legacy ExtendScript.

For more information on specific syntax differences between the JavaScript and Legacy ExtendScript expression engines, see Syntax differences between the JavaScript and Legacy ExtendScript expression engines.

Improvements provided by the JavaScript engine

- Higher mathematical precision in floating-point operations.
- Array and string methods from modern JavaScript can be used.

- Other modern JavaScript objects like typed arrays, usage of keywords 'let' and 'const', and many other additions made in recent versions of the ECMA-262 Standard are available.

Differences between the JavaScript engine and ExtendScript

- The syntax for if/else statements is strict in the JavaScript engine and need to be written for standardized JavaScript.
- When accessing the indexes of characters on a Text Layer as an array, use *text.sourceText.value[i]* instead of *text.sourceText[i]*.
- Older snake_case expression methods such as *this_comp* and *to_world*, which had been previously deprecated in ExtendScript) are not supported.
- Simplified 'this(arg)' syntax is not supported.

Global objects, attributes, and methods (expression reference)

comp(name) Return type: Comp.

Argument type: *name* is a String.

Retrieves another composition by name.

footage(name) Return type: Footage.

Argument type: *name* is a String.

Retrieves a footage item by name.

thisComp Return type: Comp.

Represents the composition containing the expression.

thisLayer Return type: Layer, Light, or Camera.

Represents the layer containing the expression. Because *thisLayer* is the default object, its use is optional. For example, you can start an expression with *thisLayer.width* or *width* and get the same result.

thisProperty Return type: Property.

Represents the property containing the expression. For example, if you write an expression on the Rotation property, you can start an expression with *thisProperty* to refer to the Rotation property.

time Return type: Number.

Represents the composition time, in seconds, at which the expression is being evaluated.

colorDepth Return type: Number.

Returns the project color depth value. For example, *colorDepth* returns 16 when the project color depth is 16 bits per channel.

posterizeTime(framesPerSecond) Return type: Number.

Argument type: *framesPerSecond* is a Number.

The *framesPerSecond* value becomes the frame rate from which the rest of the expression operates. This expression allows you to set the frame rate for a property to be lower than the frame rate of the composition. For example, the following expression updates the property value with a random value once per second:

```
posterizeTime(1);   random()
```

value Return type: Number, Array, or String.

Represents the value at the current time for the property containing the expression.

Time conversion methods (expression reference)

timeToFrames(t = time + thisComp.displayStartTime, fps = 1.0 / thisComp.frameDuration, isDuration = false) Return type: Number.

Argument type: *t* and *fps* are Numbers; *isDuration* is a Boolean.

Converts the value of *t*, which defaults to the current composition time, to an integer number of frames. The number of frames per second is specified in the *fps* argument, which defaults to the frame rate of the current composition (*1.0 / thisComp.frameDuration*). The *isDuration* argument, which defaults to false, should be true if the *t* value represents a difference between two times instead of an absolute time. Absolute times are rounded down toward negative infinity; durations are rounded away from zero (up for positive values).

framesToTime(frames, fps = 1.0 / thisComp.frameDuration) Return type: Number.

Argument type: *frames* and *fps* are Numbers.

The inverse of *timeToFrames*. Returns the time corresponding to the *frames* argument, which is required. It doesn't have to be an integer. See *timeToFrames* for explanation of the *fps* argument.

timeToTimecode(t = time + thisComp.displayStartTime, timecodeBase = 30, isDuration = false) Return type: String.

Argument type: *t* and *timecodeBase* are Numbers; *isDuration* is a Boolean.

Converts the value of *t* to a String representing timecode. See *timeToFrames* for an explanation of the *t* and *isDuration* arguments. The *timecodeBase* value, which defaults to 30, specifies the number of frames in one second.

timeToNTSCTimecode(t = time + thisComp.displayStartTime, ntscDropFrame = false, isDuration = false) Return type: String.

Argument type: *t* is a Number, *ntscDropFrame* and *isDuration* are Booleans.

Converts *t* to a String representing NTSC timecode. See *timeToFrames* for an explanation of the *t* and *isDuration* arguments. If *ntscDropFrame* is false (the default), the result String is NTSC non-drop-frame timecode. If *ntscDropFrame* is true, the result String is NTSC drop-frame timecode.

timeToFeetAndFrames(t = time + thisComp.displayStartTime, fps = 1.0 / thisComp.frameDuration, framesPerFoot = 16, isDuration = false) Return type: String.

Argument type: *t*, *fps*, and *framesPerFoot* are Numbers; *isDuration* is a Boolean.

Converts the value of *t* to a String representing feet of film and frames. See *timeToFrames* for an explanation of the *t*, *fps*, and *isDuration* arguments. The *framesPerFoot* argument specifies the number of frames in one foot of film. It defaults to 16, which is the most common rate for 35mm footage.

timeToCurrentFormat(t = time + thisComp.displayStartTime, fps = 1.0 / thisComp.frameDuration, isDuration = false) Return type: String.

Argument type: t and fps are Numbers; isDuration is a Boolean.

Converts the value of t to a String representing time in the current Project Settings display format. See *timeToFrames* for a definition of all the arguments.

An optional *ntscDropFrame* argument was added to the *timeToCurrentFormat()* function in After Effects CS5.5 and later. Default: *ntscDropFrame = thisComp.ntscDropFrame*.

If you want more control over the look of timecode in your footage, use the timeToCurrentFormat method or other timeTo methods to generate the timecode instead of using the Timecode or Numbers effect. Create a text layer, add an expression to the Source Text property, and enter timeToCurrentFormat() in the expression field. With this method, you can format and animate the timecode text. In addition, the timecode uses the same display style defined by the current project settings.

Vector Math methods (expression reference)

Vector Math functions are global methods that perform operations on arrays, treating them as mathematical vectors. Unlike built-in JavaScript methods, such as *Math.sin*, these methods are not used with the *Math* prefix. Unless otherwise specified, Vector Math methods are lenient about dimensions and return a value that is the dimension of the largest input Array object, filling in missing elements with zeros. For example, the expression *add([10, 20], [1, 2, 3])* returns *[11, 22, 3]*.

JJ Gifford's website provides explanations and examples that show how to use simple geometry and trigonometry with expressions.

add(vec1, vec2) Return type: Array.

Argument type: *vec1* and *vec2* are Arrays.

Adds two vectors.

sub(vec1, vec2) Return type: Array.

Argument type: *vec1* and *vec2* are Arrays.

Subtracts two vectors.

mul(vec, amount) Return type: Array.

Argument type: *vec* is an Array, *amount* is a Number.

Multiplies every element of the vector by the amount.

div(vec, amount) Return type: Array.

Argument type: *vec* is an Array, *amount* is a Number.

Divides every element of the vector by the amount.

clamp(value, limit1, limit2) Return type: Number or Array.

Argument type: value, limit1, and limit2 are Numbers or Arrays.

The value of each component of value is constrained to fall between the values of the corresponding values of limit1 and limit2.

dot(vec1, vec2) Return type: Number.

Argument type: *vec1* and *vec2* are Arrays.

Returns the dot (inner) product of the vector arguments.

cross(vec1, vec2) Return type: Array [2 or 3].

Argument type: *vec1* and *vec2* are Arrays [2 or 3].

Returns the vector cross product of *vec1* and *vec2*. Refer to a math reference or JavaScript guide for more information.

normalize(vec) Return type: Array.

Argument type: *vec* is an Array.

Normalizes the vector so that its length is 1.0. Using the *normalize* method is a short way of performing the operation *div(vec, length(vec))*.

length(vec) Return type: Number.

Argument type: *vec* is an Array.

Returns the length of vector *vec*.

length(point1, point2) Return type: Number.

Argument type: *point1* and *point2* are Arrays.

Returns the distance between two points. The *point2* argument is optional. For example, *length(point1, point2)* is the same as *length(sub(point1, point2))*.

For example, add this expression to the Focus Distance property of a camera to lock the focal plane to the camera's point of interest so that the point of interest is in focus:

```
length(position, pointOfInterest)
```

lookAt(fromPoint, atPoint) Return type: Array [3].

Argument type: fromPoint and atPoint are Arrays [3].

The argument fromPoint is the location in world space of the layer you want to orient. The argument atPoint is the point in world space you want to point the layer at. The return value can be used as an expression for the Orientation property, making the z-axis of the layer point at atPoint. This method is especially useful for cameras and lights. If you use this expression on a camera, turn off auto-orientation. For example, this expression on the Orientation property of a spot light makes the light point at the anchor point of layer number 1 in the same composition: *lookAt(position, thisComp.layer(1).position)*

Random Numbers methods (expression reference)

Note:

The wiggle method—which is used to randomly vary a property value—is in the Property attributes and methods category. For more information, see Property attributes and methods (expression reference).

seedRandom(offset, timeless=false) Return type: none.

Argument type: *offset* is a Number, *timeless* is a Boolean.

The *random* and *gaussRandom* methods use a seed value that controls the sequence of numbers. By default, the seed is computed as a function of a unique layer identifier, the property within the layer, the current time, and an offset value of 0. Call *seedRandom* to set the offset to something other than 0 to create a different random sequence.

Use *true* for the *timeless* argument to not use the current time as input to the random seed. Using *true* for the *timeless* argument allows you to generate a random number that doesn't vary depending on the time of evaluation.

The *offset* value, but not the *timeless* value, is also used to control the initial value of the *wiggle* function.

For example, this expression on the Opacity property sets the Opacity value to a random value that does not vary with time:

```
seedRandom(123456, true);   random()*100
```

The multiplication by 100 in this example converts the value in the range 0–1 returned by the *random* method into a number in the range 0–100; this range is more typically useful for the Opacity property, which has values from 0% to 100%.

random() Return type: Number.

Returns a random number in the range 0–1.

In After Effects CC and CS6, the behavior of random() is changed to be more random when layer IDs are close together. The wiggle() expression is not affected.

random(maxValOrArray) Return type: Number or Array.

Argument type: *maxValOrArray* is a Number or Array.

If *maxValOrArray* is a Number, this method returns a number in the range from 0 to *maxValOrArray*. If *maxValOrArray* is an Array, this method returns an Array with the same dimension as *maxValOrArray,* with each component ranging from 0 to the corresponding component of *maxValOrArray.*

random(minValOrArray, maxValOrArray) Return type: Number or Array.

Argument type: *minValOrArray* and *maxValOrArray* are Numbers or Arrays.

If *minValOrArray* and *maxValOrArray* are Numbers, this method returns a number in the range from *minValOrArray* to *maxValOrArray*. If the arguments are Arrays, this method returns an Array with the same dimension as the argument with the greater dimension, with each component in the range from the corresponding component of *minValOrArray* to the corresponding component of *maxValOrArray*. For example, the expression *random([100, 200], [300, 400])* returns an Array whose first value is in the range 100–300 and whose second value is in the range 200–400. If the dimensions of the two input Arrays don't match, higher-dimension values of the shorter Array are filled out with zeros.

gaussRandom() Return type: Number.

Returns a random number. The results have a Gaussian (bell-shaped) distribution. Approximately 90% of the results are in the range 0–1, and the remaining 10% are outside this range.

gaussRandom(maxValOrArray) Return type: Number or Array.

Argument type: *maxValOrArray* is a Number or Array.

When *maxValOrArray* is a Number, this method returns a random number. Approximately 90% of the results are in the 0 to *maxValOrArray* range, and the remaining 10% are outside this range. When *maxValOrArray* is an Array, this method returns an Array of random values, with the same dimension as *maxValOrArray*. 90% of the values are in the range from 0 to *maxValOrArray*, and the remaining 10% are outside this range. The results have a Gaussian (bell-shaped) distribution.

gaussRandom(minValOrArray, maxValOrArray) Return type: Number or Array.

Argument type: *minValOrArray* and *maxValOrArray* are Numbers or Arrays.

If *minValOrArray* and *maxValOrArray* are Numbers, this method returns a random number. Approximately 90% of the results are in the range from *minValOrArray* to *maxValOrArray*, and the remaining 10% are outside this range. If the arguments are Arrays, this method returns an Array of random numbers with the same dimension as the argument with the greater dimension. For each component, approximately 90% of the results are in the range from the corresponding component of *minValOrArray* to the corresponding component of *maxValOrArray*, and the remaining 10% are outside this range. The results have a Gaussian (bell-shaped) distribution.

noise(valOrArray) Return type: Number.

Argument type: valOrArray is a Number or an Array [2 or 3].

Returns a number in the range from -1 to 1. The noise is not actually random; it is based on Perlin noise, which means that the return values for two input values that are near one another tend to be near one another. This type of noise is

useful when you want a sequence of seemingly random numbers that don't vary wildly from one to the other—as is usually the case when animating any apparently random natural motion. Example: *rotation + 360*noise(time)*

Interpolation methods (expression reference)

For all the Interpolation methods, the argument t is often *time* or *value*, though it can have other values, instead. If t is *time*, the interpolation between values happens over a duration. If t is *value*, then the expression maps one range of values to a new range of values.

For additional explanations and examples of the Interpolation methods, see JJ Gifford's website.

Chris and Trish Meyer provide additional information and examples for these methods in an article on the ProVideo Coalition website.

Ian Haigh provides a script on After Effects Scripts website that you can use to easily apply advanced interpolation method expressions—such as bounces—to properties.

Andrew Devis provides a pair of video tutorials on the Creative COW website that show in detail how to use the *linear* expression method along with the Convert Audio To Keyframes command.

linear(t, tMin, tMax, value1, value2) Return type: Number or Array.

Argument type: t, tMin, and tMax are Numbers, and value1 and value2 are Numbers or Arrays.

Returns value1 when t <= tMin. Returns value2 when t >= tMax. Returns a linear interpolation between value1 and value2 when tMin < t < tMax.

For example, this expression on the Opacity property causes Opacity values to ramp linearly from 20% to 80% over the time from 0 seconds to 6 seconds:

linear(time, 0, 6, 20, 80)

This method—like all the Interpolation methods—can also be used to convert from one range of values to another. For example, this expression on the Opacity property converts the Opacity values from the range 0%-100% to the range 20%-80%:

linear(value, 0, 100, 20, 80)

linear(t, value1, value2) Return type: Number or Array.

Argument type: *t* is a Number, and *value1* and *value2* are Numbers or Arrays.

Returns a value that linearly interpolates from *value1* to *value2* as *t* ranges from 0 to 1. Returns *value1* when *t* <= 0. Returns *value2* when *t* >= 1.

ease(t, value1, value2) Return type: Number or Array.

Argument type: t is a Number, and value1 and value2 are Numbers or Arrays.

Similar to *linear* with the same arguments, except that the interpolation eases in and out so that the velocity is 0 at the start and end points. This method results in a smooth animation.

ease(t, tMin, tMax, value1, value2) Return type: Number or Array.

Argument type: t, tMin, and tMax are Numbers, and value1 and value2 are Numbers or Arrays.

Similar to *linear* with the same arguments, except that the interpolation eases in and out so that the velocity is 0 at the start and end points. This method results in a smooth animation.

easeIn(t, value1, value2) Return type: Number or Array.

Argument type: *t* is a Number, and *value1* and *value2* are Numbers or Arrays.

Similar to *ease*, except that the tangent is 0 only on the *value1* side and interpolation is linear on the *value2* side.

easeIn(t, tMin, tMax, value1, value2) Return type: Number or Array.

Argument type: *t*, *tMin*, and *tMax* are Numbers, and *value1* and *value2* are Numbers or Arrays.

Similar to *ease*, except that the tangent is 0 only on the *tMin* side and interpolation is linear on the *tMax* side.

easeOut(t, value1, value2) Return type: Number or Array.

Argument type: *t* is a Number, and *value1* and *value2* are Numbers or Arrays.

Similar to *ease*, except that the tangent is 0 only on the *value2* side and interpolation is linear on the *value1* side.

easeOut(t, tMin, tMax, value1, value2) Return type: Number or Array.

Argument type: *t*, *tMin*, and *tMax* are Numbers, and *value1* and *value2* are Numbers or Arrays.

Similar to *ease*, except that the tangent is 0 only on the *tMax* side and interpolation is linear on the *tMin* side.

Color Conversion methods (expression reference)

Harry Frank provides a video tutorial on his graymachine website that shows how to use these color conversion methods to change the color of the waves produced by the Radio Waves effect.

rgbToHsl(rgbaArray) Return type: Array [4].

Argument type: *rgbaArray* is an Array [4].

Converts a color in RGBA space to HSLA space. The input is an Array of normalized red, green, blue, and alpha channel values, all in the range of 0.0 to 1.0. The resulting value is an Array of hue, saturation, lightness, and alpha channel values, also in the range of 0.0 to 1.0. Example:

rgbToHsl.effect("Change Color")("Color To Change")

hslToRgb(hslaArray) Return type: Array [4].

Argument type: *hslaArray* is an Array [4].

Converts a color in HSLA space to RGBA space. This conversion is the opposite of the conversion performed by the *rgbToHsl* method.

Other Math methods (expression reference)

degreesToRadians(degrees) Return type: Number.

Argument type: *degrees* is a Number.

Converts degrees to radians.

radiansToDegrees(radians) Return type: Number.

Argument type: *radians* is a Number.

Converts radians to degrees.

Comp attributes and methods (expression reference)

layer(index) Return type: Layer, Light, or Camera.

Argument type: *index* is a Number.

Retrieves the layer by number (order in the Timeline panel). Example: *thisComp.layer(3)*

layer(name) Return type: Layer, Light, or Camera.

Argument type: *name* is a String.

Retrieves the layer by name. Names are matched according to layer name, or source name if there is no layer name. If duplicate names exist, After Effects uses the first (topmost) one in the Timeline panel. Example:

thisComp.layer("Solid 1")

layer(otherLayer, relIndex) Return type: Layer, Light, or Camera.

Argument type: *otherLayer* is a Layer object, and *relIndex* is a Number.

Retrieves the layer that is *relIndex* layers above or below *otherLayer*. For example, *thisComp.layer(thisLayer, 1).active* returns true if the next layer down in the Timeline panel is active.

marker Return type: MarkerProperty.

Note:

You cannot access a composition marker by marker number. If you have a project created in a previous version of After Effects that uses composition marker numbers in expressions, you must change those calls to use marker.key(name) instead. Because the default name of a composition marker is a number, converting the reference to use the name is often just a matter of surrounding the number with quotation marks.

marker.key(index) Return type: MarkerKey.

Argument type: index is a Number.

Returns the MarkerKey object of the marker with the specified index. The index refers to the order of the marker in composition time, not to the name of the marker. For example, this expression returns the time of the first composition marker:

thisComp.marker.key(1).time

marker.key(name) Return type: MarkerKey.

Argument type: *name* is a String.

Returns the MarkerKey object of the marker with the specified name. The *name* value is the name of the marker, as typed in the comment field in the marker dialog box, for example, *marker.key("1")*. For a composition marker, the default name is a number. If more than one marker in the composition has the same name, this method returns the marker that occurs first in time (in composition time). The value for a marker key is a String, not a Number. For example, this expression returns the time of the composition marker with the name "0":

thisComp.marker.key("0").time

marker.nearestKey(t) Return type: MarkerKey.

Argument type: *t* is a Number.

Returns the marker that is nearest in time to *t*. For example, this expression returns the time of the composition marker nearest to the time of 1 second:

thisComp.marker.nearestKey(1).time

This expression returns the time of the composition marker nearest to the current time:

thisComp.marker.nearestKey(time).time

marker.numKeys Return type: Number.

Returns the total number of composition markers in the composition.

numLayers Return type: Number.

Returns the number of layers in the composition.

activeCamera Return type: Camera.

Returns the Camera object for the camera through which the composition is rendered at the current frame. This camera is not necessarily the camera through which you are looking in the Composition panel.

width Return type: Number.

Returns the composition width, in pixels.

Apply the following expression to the Position property of a layer to center the layer in the composition frame:

[thisComp.width/2, thisComp.height/2]

height Return type: Number.

Returns the composition height, in pixels.

duration Return type: Number.

Returns the composition duration, in seconds.

ntscDropFrame Return type: Boolean.

Returns true if the timecode is in drop-frame format. (After Effects CS5.5and later.)

displayStartTime Return type: Number.

Returns the composition start time, in seconds.

frameDuration Return type: Number.

Returns the duration of a frame, in seconds.

shutterAngle Return type: Number.

Returns the shutter-angle value of the composition, in degrees.

shutterPhase Return type: Number.

Returns the shutter phase of the composition, in degrees.

bgColor Return type: Array [4].

Returns the background color of the composition.

pixelAspect Return type: Number.

Returns the pixel aspect ratio of the composition.

name Return type: String.

Returns the name of the composition.

Composition marker protected region attribute

The Protected Region option for composition markers can be read with the *protectedRegion* composition marker attribute.

Footage attributes and methods (expression reference)

To use a footage item from the Project panel as an object in an expression, use the global *footage* method, as in *footage("file_name")*. You can also access a footage object using the *source* attribute on a layer whose source is a footage item.

width Return type: Number.

Returns the width of the footage item, in pixels.

height Return type: Number.

Returns the height of the footage item, in pixels.

duration Return type: Number.

Returns the duration of the footage item, in seconds.

frameDuration Return type: Number.

Returns the duration of a frame in the footage item, in seconds.

ntscDropFrame Return type: Boolean.

Returns true if the timecode is in drop-frame format. (After Effects CS5.5 and later.)

pixelAspect Return type: Number.

Returns the pixel aspect ratio of the footage item.

name Return type: String.

Returns the name of the footage item as shown in the Project panel.

Layer Sub-objects attributes and methods (expression reference)

Note:

For After Effects CC and CS6, the Expression language menu, the "Layer Sub-objects", "Layer General", "Layer Properties", "Layer 3D", and "Layer Space Transforms" have been arranged into a "Layer" submenu.

source Return type: Comp or Footage.

Returns the source Comp or source Footage object for the layer. Default time is adjusted to the time in the source. Example: *source.layer(1).position*

sourceTime(t = time) Return type: Number.

Returns the layer source corresponding to time *t*. (After Effects CS5.5 and later.)

sourceRectAtTime(t = time, includeExtents = false) Return type: JavaScript object with four attributes: [top, left, width, height]. Extents apply only to shape layers, increasing the size of the layer bounds as necessary, and paragraph text layers (After Effects 15.1 and later), where it returns the bounds of the paragraph box. Example: myTextLayer.sourceRectAtTime().width.

effect(name) Return type: Effect.

Argument type: *name* is a String.

After Effects finds the effect by its name in the Effect Controls panel. The name can be the default name or a user-defined name. If multiple effects have the same name, the effect closest to the top of the Effect Controls panel is used. Example:

effect("Fast Blur")("Blurriness")

effect(index) Return type: Effect.

Argument type: *index* is a Number.

After Effects finds the effect by its index in the Effect Controls panel, starting at 1 and counting from the top.

mask(name) Return type: Mask.

Argument type: *name* is a String.

The name can be the default name or a user-defined name. If multiple masks have the same name, the first (topmost) mask is used. Example:

mask("Mask 1")

mask(index) Return type: Mask.

Argument type: *index* is a Number.

After Effects finds the mask by its index in the Timeline panel, starting at 1 and counting from the top.

Layer General attributes and methods (expression reference)

width Return type: Number.

Returns the width of the layer, in pixels. It is the same as *source.width*.

height Return type: Number.

Returns the height of the layer, in pixels. It is the same as *source.height*.

index Return type: Number.

Returns the index number of the layer in the composition.

parent Return type: Layer, Light, or Camera.

Returns the parent Layer object of the layer, if it has one. Example: *position[0] + parent.width*

hasParent Return type: Boolean.

Returns true if the layer has a parent or false if it doesn't.

Use the *hasParent* attribute to determine if a layer has a parent layer. You can use this attribute even if the layer has no parent layer at present. For example, the following expression indicates that the layer to which you apply it wiggles based on the position of the parent. If the layer has no parent, then it wiggles based on its own position. If the layer is given a parent later, then the behavior of the layer changes accordingly:

idx = index; if (hasParent) { idx = parent.index; } thisComp.layer(idx).position.wiggle(5,20)

inPoint Return type: Number.

Returns the In point of the layer, in seconds.

Note:

In general, the value of outPoint is greater than the value of inPoint. However, if a layer is reversed in time, the value of inPoint is greater than the value of outPoint. Similarly, the value of startTime can be greater than the value of inPoint.

outPoint Return type: Number.

Returns the Out point of the layer, in seconds.

startTime Return type: Number.

Returns the start time of the layer, in seconds.

hasVideo Return type: Boolean.

Returns true if the layer has video, or false if it doesn't.

hasAudio Return type: Boolean.

Returns true if the layer has audio or false if it doesn't.

active Return type: Boolean.

Returns true if the Video switch is on for the layer and the current time is in the range from the In point of the layer to the Out point of the layer; false otherwise.

enabled Return type: Boolean.

Returns true if the Video switch is on for the layer; false otherwise.

audioActive Return type: Boolean.

Returns true if the Audio switch is on for the layer and the current time is in the range from the In point of the layer to the Out point of the layer; false otherwise.

sampleImage(point, radius = [.5, .5], postEffect=true, t=time) Return type: Array [4].

Argument type: point is an Array [2], radius is an Array [2], postEffect is a Boolean, and t is a Number.

Samples the color and alpha channel values of a layer and returns the average alpha-weighted value of the pixels within the specified distance of the point as an array: [red, green, blue, alpha]. If postEffect is true, the sampled values are for the layer after masks and effects on that layer have been rendered; if postEffect is false, the sampled values are for the layer before masks and effects have been rendered. The input value point is in layer space; the point [0,0] is the center of the upper-left pixel in the layer. The input value radius specifies the horizontal and vertical distance from the sample center to the edges of the sampled rectangle. The default value samples one pixel.

Note:

The postEffect parameter refers to effects applied directly to the layer, not to effects applied indirectly, such as with an adjustment layer.

Note:

Using sampleImage in an expression no longer disables multiprocessing.

This example samples a rectangle 4 pixels wide and 3 pixels high, centered around a point 100 pixels down and to the right of the upper-left corner of the layer:

```
thisComp.layer(1).sampleImage([100, 100], [2, 1.5])
```

Dan Ebberts provides an example of how to use the *sampleImage* method on his MotionScript website.

Todd Kopriva provides instructions for using the *sampleImage* method and the Point Control effect to monitor colors for a specified point during color correction on his After Effects Region of Interest blog.

Layer Properties attributes and methods (expression reference)

When you add masks, effects, paint, or text to a layer, After Effects adds new properties to the Timeline panel. There are too many of these properties to list here, so use the pick whip to learn the syntax for referring to them in your expressions.

anchorPoint Return type: Property [2 or 3].

Returns the anchor point value of the layer in the coordinate system of the layer (layer space).

position Return type: Property [2 or 3].

Returns the position value of the layer, in world space if the layer has no parent. If the layer has a parent, it returns the position value of the layer in the coordinate system of the parent layer (in the layer space of the parent layer).

scale Return type: Property [2 or 3].

Returns the scale value of the layer, expressed as a percentage.

rotation Return type: Property.

Returns the rotation value of the layer in degrees. For a 3D layer, it returns the z rotation value in degrees.

opacity Return type: Property.

Returns the opacity value for the layer, expressed as a percentage.

audioLevels Return type: Property [2].

Returns the value of the Audio Levels property of the layer, in decibels. This value is a 2D value; the first value represents the left audio channel, and the second value represents the right. The value is not the amplitude of the audio track of the source material. Instead, it is the value of the Audio Levels property, which may be affected by keyframes.

timeRemap Return type: Property.

Returns the value of the Time Remap property, in seconds, if Time Remap is enabled.

marker.key(index) Return type: MarkerKey.

Argument type: *index* is a Number.

Returns the MarkerKey object of the layer marker with the specified index.

marker.key(name) Return type: MarkerKey.

Argument type: *name* is a String.

Returns the MarkerKey object of the layer marker with the specified name. The *name* value is the name of the marker, as typed in the comment field in the marker dialog box, for example, *marker.key("ch1")*. If more than one marker on the layer has the same name, this method returns the marker that occurs first in time (in layer time). The value for a marker key is a String, not a Number.

This expression on a property ramps the value of the property from 0 to 100 between two markers identified by name:

```
m1 = marker.key("Start").time;   m2 = marker.key("End").time;   linear(time, m1, m2, 0, 100);
```

marker.nearestKey(t) Return type: MarkerKey.

Argument type: *t* is a Number.

Returns the layer marker that is nearest in time to *t*. For example, this expression returns the time of the marker on the layer nearest to the time of 1 second:

```
marker.nearestKey(1).time
```

This expression returns the time of the marker on the layer nearest to the current time:

marker.nearestKey(time).time

marker.numKeys Return type: Number.

Returns the total number of markers on the layer.

name Return type: String.

Returns the name of the layer.

Layer 3D attributes and methods (expression reference)

orientation Return type: Property [3].

Returns the 3D orientation value, in degrees, for a 3D layer.

rotationX Return type: Property.

Returns the x rotation value, in degrees, for a 3D layer.

rotationY Return type: Property.

Returns the y rotation value, in degrees, for a 3D layer.

rotationZ Return type: Property.

Returns the z rotation value, in degrees, for a 3D layer.

lightTransmission Return type: Property.

Returns the value of the Light Transmission property for a 3D layer.

castsShadows Return type: Property.

Returns a value of 1.0 if the layer casts shadows.

acceptsShadows Return type: Property.

Returns a value of 1.0 if the layer accepts shadows.

acceptsLights Return type: Property.

Returns a value of 1.0 if the layer accepts lights.

ambient Return type: Property.

Returns the ambient component value as a percentage.

diffuse Return type: Property.

Returns the diffuse component value as a percentage.

specular Return type: Property.

Returns the specular component value as a percentage.

shininess Return type: Property.

Returns the shininess component value as a percentage.

metal Return type: Property.

Returns the metal component value as a percentage.

Layer Space Transforms methods (expression reference)

Use layer space transform methods to transform values from one space to another, such as from layer space to world space. The "from" methods transform values from the named space (composition or world) to the layer space. The "to" methods transform values from the layer space to the named space (composition or world). Each transform method takes an optional argument to determine the time at which the transform is computed; however, you can almost always use the current (default) time.

Use "Vec" transform methods when transforming a direction vector, such as the difference between two position values. Use the plain (non-"Vec") transform methods when transforming a point, such as position. Composition (comp) and world space are the same for 2D layers. For 3D layers, however, composition space is relative to the active camera, and world space is independent of the camera.

toComp(point, t=time) Return type: Array [2 or 3].

Argument type: *point* is an Array [2 or 3], and *t* is a Number.

Transforms a point from layer space to composition space.

fromComp(point, t=time) Return type: Array [2 or 3].

Argument type: *point* is an Array [2 or 3], and *t* is a Number.

Transforms a point from composition space to layer space. The resulting point in a 3D layer may have a nonzero value even though it is in layer space. Example: *fromComp(thisComp.layer(2).position)*

toWorld(point, t=time) Return type: Array [2 or 3].

Argument type: point is an Array [2 or 3], and t is a Number.

Transforms a point from layer space to view-independent world space. Example:

toWorld.effect("Bulge")("Bulge Center")

Dan Ebberts provides an expression on his MotionScript website that uses the *toWorld* method to auto-orient a layer along only one axis. This is useful, for example, for having characters turn from side to side to follow the camera while remaining upright.

Rich Young provides a set of expressions on his AE Portal website that use the *toWorld* method link a camera and light to a layer with the CC Sphere effect.

fromWorld(point, t=time) Return type: Array [2 or 3].

Argument type: *point* is an Array [2 or 3], and *t* is a Number.

Transforms a point from world space to layer space. Example: *fromWorld(thisComp.layer(2).position)*

See Expression example: Create a bulge between two layersfor an example of how this method can be used.

toCompVec(vec, t=time) Return type: Array [2 or 3].

Argument type: *vec* is an Array [2 or 3], and *t* is a Number.

Transforms a vector from layer space to composition space. Example: *toCompVec([1,0])*

fromCompVec(vec, t=time) Return type: Array [2 or 3].

Argument type: *vec* is an Array [2 or 3], and *t* is a Number.

Transforms a vector from composition space to layer space. Example (2D layer):

dir=sub(position, thisComp.layer(2).position); fromCompVec(dir)

toWorldVec(vec, t=time) Return type: Array [2 or 3].

Argument type: *vec* is an Array [2 or 3], and *t* is a Number.

Transforms a vector from layer space to world space. Example: *p1 = effect("Eye Bulge 1")("Bulge Center"); p2 = effect("Eye Bulge 2")("Bulge Center"); toWorld(sub(p1, p2))*

fromWorldVec(vec, t=time) Return type: Array [2 or 3].

Argument type: *vec* is an Array [2 or 3], and *t* is a Number.

Transforms a vector from world space to layer space. Example: *fromWorld(thisComp.layer(2).position)*

fromCompToSurface(point, t=time) Return type: Array [2].

Argument type: *point* is an Array [2 or 3], and *t* is a Number.

Projects a point located in composition space to a point on the surface of the layer (zero z-value) at the location where it appears when viewed from the active camera. This method is useful for setting effect control points. Use with 3D layers only.

Camera attributes and methods (expression reference)

Camera objects have the same attributes and methods as Layer objects, except for *source*, *effect*, *mask*, *width*, *height*, *anchorPoint*, *scale*, *opacity*, *audioLevels*, *timeRemap*, and all the material properties.

pointOfInterest Return type: Property [3].

Returns the point of interest values of a camera in world space.

zoom Return type: Property.

Returns the zoom values of a camera in pixels.

Here's an expression for the Scale property of a layer that maintains the relative size of the layer in frame while changing the z position (depth) of a layer or the Zoom value of a camera:

*cam = thisComp.activeCamera; distance = length(sub(position, cam.position)); scale * distance / cam.zoom;*

depthOfField Return type: Property.

Returns 1 if the Depth Of Field property of a camera is on, or returns 0 if the Depth Of Field property is off.

focusDistance Return type: Property.

Returns the focus distance value of a camera, in pixels.

aperture Return type: Property.

Returns the aperture value of a camera, in pixels.

blurLevel Return type: Property.

Returns the blur level value of a camera as a percentage.

active Return type: Boolean.

Returns true if the camera is the active camera for the composition at the current time: the Video switch for the camera layer is on, the current time is in the range from the In point of the camera layer to the Out point of the camera layer, and it is the first (topmost) such camera layer listed in the Timeline panel. Returns false otherwise.

Light attributes and methods (expression reference)

Light objects have the same attributes and methods as Layer objects, except for *source*, *effect*, *mask*, *width*, *height*, *anchorPoint*, *scale*, *opacity*, *audioLevels*, *timeRemap*, and all the material properties.

pointOfInterest Return type: Property [3].

Returns the point of interest values for a light in world space.

intensity Return type: Property.

Returns the intensity values of a light as a percentage.

color Return type: Property [4].

Returns the color value of a light.

coneAngle Return type: Property.

Returns the cone angle of a light, in degrees.

coneFeather Return type: Property.

Returns the cone feather value of a light as a percentage.

shadowDarkness Return type: Property.

Returns the shadow darkness value of a light as a percentage.

shadowDiffusion Return type: Property.

Returns the shadow diffusion value of a light, in pixels.

David Van Brink provides an instructional article and sample project on his omino pixel blog that show how to use expressions with lights.

Effect attributes and methods (expression reference)

active Return type: Boolean.

Returns true if the effect is turned on (the Effect switch is selected).

param(name) Return type: Property.

Argument type: *name* is a String.

Returns a property within an effect. Effect control points are always in layer space. Example:

effect("Bulge").param("Bulge Height")

param(index) Return type: Property.

Argument type: *index* is a Number.

Returns a property within an effect. Effect control points are always in layer space. For example, *effect("Bulge").param(4)* returns the Bulge Height property.

Mask attributes and methods (expression reference)

Note:

You can link Mask Path properties to other path properties (paths in a shape layer and brush strokes), but the properties are not accessible for direct numerical manipulation through expressions.

maskOpacity Return type: Property.

Returns the opacity value of a mask as a percentage.

maskFeather Return type: Property.

Returns the feather value of a mask, in pixels.

maskExpansion Return type: Property.

Returns the expansion value of a mask, in pixels.

invert Return type: Boolean.

Returns true if the mask is inverted or false if it is not.

Property attributes and methods (expression reference)

value Return type: Number, Array, or String.

Returns the value of a property at the current time.

valueAtTime(t) Return type: Number or Array.

Argument type: t is a Number.

Returns the value of a property at the specified time, in seconds.

For example, to have a property value for each frame chosen randomly from a set of four values, set your four values as keyframes at 0, 1, 2, and 3 seconds, and then apply the following expression to the property:

valueAtTime(random(4))

Note:

Dan Ebberts provides more examples and techniques for using the valueAtTime and velocityAtTime methods on his MotionScript website.

velocity Return type: Number or Array.

Returns the temporal velocity value at the current time. For spatial properties, such as Position, it returns the tangent vector value. The result is the same dimension as the property.

velocityAtTime(t) Return type: Number or Array.

Argument type: *t* is a Number.

Returns the temporal velocity value at the specified time.

speed Return type: Number.

Returns a 1D, positive speed value equal to the speed at which the property is changing at the default time. This element can be used only for spatial properties.

speedAtTime(t) Return type: Number.

Argument type: *t* is a Number.

Returns the spatial speed value at the specified time.

wiggle(freq, amp, octaves=1, amp_mult=.5, t=time) Return type: Number or Array.

Argument type: freq, amp, octaves, amp_mult, and t are Numbers.

Randomly shakes (wiggles) the value of the property.

freq value is the frequency in wiggles per second.

amp value is the amplitude in units of the property to which it is applied.

octaves is the number of octaves of noise to add together. This value controls how much detail is in the wiggle. Make this value higher than the default of 1 to include higher frequencies or lower to include amplitude harmonics in the wiggle.

amp_mult is the amount that amp is multiplied by for each octave. This value controls how fast the harmonics drop off. The default is 0.5; make it closer to 1 to have the harmonics added at the same amplitude as the base frequency, or closer to 0 to add in less detail.

t is the base start time. This value defaults to the current time. Use this parameter if you want the output to be a wiggle of the property value sampled at a different time.

Example: *position.wiggle(5, 20, 3, .5)* produces about 5 wiggles per second with an average size of about 20 pixels. In addition to the main wiggle, two more levels of detailed wiggles occur with a frequency of 10 and 20 wiggles per second, and sizes of 10 and 5 pixels, respectively.

This example, on a two-dimensional property such as Scale, wiggles both dimensions by the same amount:

```
v = wiggle(5, 10);   [v[0], v[0]]
```

This example, on a two-dimensional property, wiggles only along the y-axis:

```
freq = 3;   amp = 50;   w = wiggle(freq,amp);   [value[0],w[1]];
```

Dan Ebberts provides an example expression and a detailed explanation on his MotionScript website that shows how to use the time parameter of the *wiggle* method to create a looping animation.

temporalWiggle(freq, amp, octaves=1, amp_mult=.5, t=time) Return type: Number or Array.

Argument type: *freq*, *amp*, *octaves*, *amp_mult*, and *t* are Numbers.

Samples the property at a wiggled time. The *freq* value is the frequency in wiggles per second, *amp* is the amplitude in units of the property to which it is applied, *octaves* is the number of octaves of noise to add together, *amp_mult* is the amount that *amp* is multiplied by for each octave, and *t* is the base start time. For this function to be meaningful, the property it samples must be animated, because the function alters only the time of sampling, not the value. Example: *scale.temporalWiggle(5, .2)*

smooth(width=.2, samples=5, t=time) Return type: Number or Array.

Argument type: *width*, *samples*, and *t* are Numbers.

Smooths the property values over time, converting large, brief deviations in the value to smaller, more evenly distributed deviations. This smoothing is accomplished by applying a box filter to the value of the property at the specified time. The *width* value is the range of time (in seconds) over which the filter is averaged. The *samples* value is the number of discrete samples evenly spaced over time; use a larger value for greater smoothness (but decreased performance). Generally, you'll want *samples* to be an odd number so that the value at the current time is included in the average. Example: *position.smooth(.1, 5)*

loopIn(type="cycle", numKeyframes=0) Return type: Number or Array.

Loops a segment of time that is measured from the first keyframe on the layer forward toward the Out point of the layer. The loop plays from the In point of the layer. The numKeyframes value determines what segment is looped: The segment looped is the portion of the layer from the first keyframe to the numKeyframes+1 keyframe. For example,

loopIn("cycle", 3) loops the segment bounded by the first and fourth keyframes. The default value of 0 means that all keyframes loop.

You can use keyframe-looping methods to repeat a series of keyframes. You can use these methods on most properties. Exceptions include properties that can't be expressed by simple numeric values in the Timeline panel, such as the Source Text property, path shape properties, and the Histogram property for the Levels effect. Keyframes or duration values that are too large are clipped to the maximum allowable value. Values that are too small result in a constant loop.

loop type	result
cycle	(default) Repeats the specified segment.
pingpong	Repeats the specified segment, alternating between forward and backward.
offset	Repeats the specified segment, but offsets each cycle by the difference in the value of the property at the start and end of the segment, multiplied by the number of times the segment has looped.
continue	Does not repeat the specified segment, but continues to animate a property based on the velocity at the first or last keyframe. For example, if the last keyframe of a Scale property of a layer is 100%, the layer continues to scale from 100% to the Out point, instead of looping directly back to the Out point. This type does not accept a keyframes or duration argument.

loopOut(type="cycle", numKeyframes=0) Return type: Number or Array.

Loops a segment of time that is measured from the last keyframe on the layer back toward the In point of the layer. The loop plays until the Out point of the layer. The specified number of keyframes determines the segment to loop. The numKeyframes value sets the number of keyframe segments to loop; the specified range is measured backward from the last keyframe. For example, *loopOut("cycle", 1)* loops the segment bounded by the last keyframe and second-to-last keyframe. The default value of 0 means that all keyframes loop. See the entry for *loopIn* for more information.

David Van Brink provides an instructional article and sample project on his omino pixel blog that show how to use the Echo effect, the Particle Playground effect, and the *loopOut* method to animate a swarm of stylized swimming bacteria.

loopInDuration(type="cycle", duration=0) Return type: Number or Array.

Loops a segment of time that is measured from the first keyframe on the layer forward toward the Out point of the layer. The loop plays from the In point of the layer. Specified duration determines the segment to loop. The duration value sets the number of composition seconds in a segment to loop; the specified range is measured from the first keyframe. For example, *loopInDuration("cycle",1)* loops the first second of the entire animation. The default of 0 means that the segment to loop begins at the layer Out point. See the entry for *loopIn* for more information.

loopOutDuration(type="cycle", duration=0) Return type: Number or Array.

Loops a segment of time that is measured from the last keyframe on the layer back toward the In point of the layer. The loop plays until the Out point of the layer. Specified duration determines the segmetn to loop. The duration value sets the number of composition seconds in a segment to loop; the specified range is measured backward from the last keyframe. For example, *loopOutDuration("cycle", 1)* loops the last second of the entire animation. The default of 0 means that the segment to loop begins at the layer In point. See the entry for *loopIn* for more information.

key(index) Return type: Key or MarkerKey.

Argument type: *index* is a Number.

Returns the Key or MarkerKey object by number. For example, *key(1)* returns the first keyframe.

key(markerName) Return type: MarkerKey.

Argument type: *markerName* is a String.

Returns the MarkerKey object with this name. Use only on marker properties.

nearestKey(t) Return type: Key or MarkerKey.

Returns the Key or MarkerKey object nearest to a designated time.

numKeys Return type: Number.

Returns the number of keyframes on a property. Returns the number of markers on a marker property.

Note:

If you use the Separate Dimensions command to separate the dimensions of the Position property into individual components, the number of keyframes changes, so the value returned by this method changes.

propertyGroup(countUp = 1) Return type: Group.

Returns a group of properties relative to the property on which the expression is written. For example, if you add the *propertyGroup(1)* expression to the Rotation property of a brush stroke, the expression targets the Transform property group, which contains the Rotation property. If you add *propertyGroup(2)* instead, the expression targets the Brush property group. This method lets you establish name-independent relationships in the property hierarchy. This method is especially useful when duplicating properties that contain expressions.

The *numProperties* method for *propertyGroup* returns the number of properties in the property group.

This example returns the number of properties in the group that contains the property on which the expression is written:

thisProperty.propertyGroup(1).numProperties

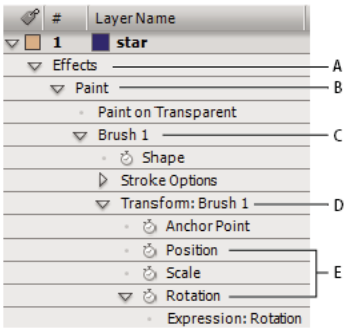
propertyIndex Return type: Number.

Returns the index of a property relative to other properties in its property group, including property groups within masks, effects, text animators, selectors, shapes, trackers, and track points.

name Return type: String.

Returns the name of the property or property group.

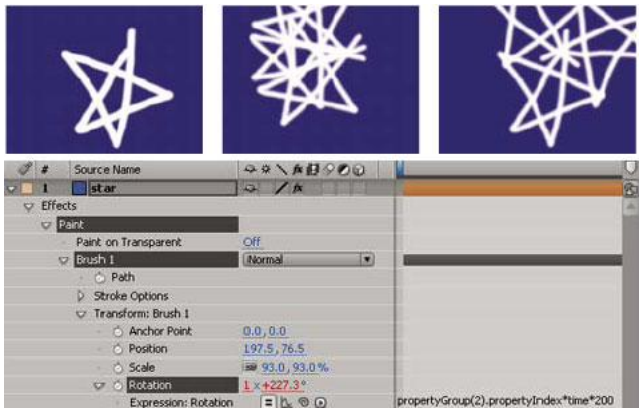
Example: Animating with the propertyGroup method and propertyIndex attribute



Values of propertyGroup relative to Position property of a brush stroke
***A** propertyGroup(4) **B** propertyGroup(3) **C** propertyGroup(2) **D** propertyGroup(1) **E** Position propertyIndex value is 2; Rotation propertyIndex value is 4.*

In this example, the *propertyGroup* method for each brush stroke targets the Brush property group because that group is two property groups up from the Rotation property. The *propertyIndex* attribute in each Brush stroke then returns a unique value for each Brush stroke. The resulting value is then multiplied by the time and 200 and applied to each rotation value, rotating each brush stroke differently, creating swirling paint strokes: *propertyGroup(2).propertyIndex * time * 200*

```
propertyGroup(2).propertyIndex * time * 200
```



Animating a brush stroke with an expression

Project properties (expression reference)

Expression method:

- thisProject object *thisProject* - Represents the project which contains the expression.

Type:

Project object; read-only

- Project fullPath attribute *thisProject.fullPath* - The platform-specific absolute file path, including the project file name. If the project has not been saved, it returns an empty string.

Type: String; read-only.

- Project bitsPerChannel attribute *thisProject.bitsPerChannel* - The color depth of the project in bits per channel (bpc), as set in **Project Settings > Color Management**. They are one of 8, 16, or 32. Equivalent to the scripting project *attribute app.project.bitsPerChannel*.

TypeNumber; read-only.

- Project linearBlending attribute *thisProject.linearBlending* - The state of the Blend Colors Using 1.0 Gamma option in **Project Settings > Color Management**. Equivalent to the scripting project attribute **app.project.linearBlending**.

Type: Boolean; read-only.

Key attributes and methods (expression reference)

When you access a Key object, you can get *time*, *index*, and *value* properties from it. For example, the following expression gives you the value of the third Position keyframe: *position.key(3).value*.

The following expression, when written on an Opacity property with keyframes, ignores the keyframe values and uses only the placement of the keyframes in time to determine where a flash should occur: *d = Math.abs(time - nearestKey(time).time); easeOut(d, 0, .1, 100, 0)*

```
d = Math.abs(time - nearestKey(time).time);
easeOut(d, 0, .1, 100, 0)
```

value Return type: Number or Array.

Returns the value of the keyframe.

time Return type: Number.

Returns the time of the keyframe.

index Return type: Number.

Returns the index of the keyframe.

MarkerKey attributes (expression reference)

You can access values for composition markers and layer markers using the same methods. Access layer markers through the *thisLayer.marker* object; access composition markers through the *thisComp.marker* object.

For the purpose of expressions, markers are a special type of Key object, so you can use methods such as *nearestKey(time)* to access markers, and markers also have *time* and *index* attributes. The *index* attribute is not the number (name) of the marker; it is the keyframe index number, representing the order of the marker in the time ruler.

Expressions have access to all the values for a marker that you can set in the Composition Marker or Layer Marker dialog box. This expression on the Source Text property of a text layer displays the time, duration, index, comment (name), chapter, URL, frame target, and cue point name for the layer marker nearest the current time, and whether the marker is for an event cue point:

```
m = thisLayer.marker.nearestKey(time);
s = "time:" + timeToCurrentFormat(m.time) + "\r" +
    "duration: " + m.duration + "\r" +
    "key index: " + m.index + "\r" +
    "comment:" + m.comment + "\r" +
    "chapter:" + m.chapter + "\r" +
    "URL:" + m.url + "\r" +
    "frame target: " + m.frameTarget + "\r" +
    "cue point name: " + m.cuePointName + "\r" +
    "Event cue point? " + m.eventCuePoint + "\r";
for (param in m.parameters){
     s += "parameter: " + param + " value: " + m.parameters[param] + "\r";
}
s
```

Because the XMP metadata in a footage item can be converted into layer markers for a layer based on that item, expressions can interact with XMP metadata. For information, see XMP metadata in After Effects.

Dan Ebberts provides a tutorial on the After Effects Developer Center that includes an example of using XMP metadata with expressions.

duration Return type: Number.

Duration, in seconds, of marker.

comment Return type: String.

Contents of Comment field in marker dialog box.

chapter Return type: String.

Contents of Chapter field in marker dialog box.

url Return type: String.

Contents of URL field in marker dialog box.

frameTarget Return type: String.

Contents of Frame Target field in marker dialog box.

eventCuePoint Return type: Boolean.

Setting for cue point type in marker dialog box. True for Event; false for Navigation.

cuePointName Return type: String.

Contents of cue point Name field in marker dialog box.

parameters Return type: associative array of String values.

Contents of Parameter Name and Parameter Value fields in marker dialog box.

For example, if you have a parameter named "background color", then you can use the following expression to access its value at the nearest marker:

thisComp.marker.nearestKey(time).parameters["background color"]

MarkerValue.protectedRegion (expression reference)

Expression method:

thisComp.marker.key(index).protectedRegion

Description:

When true, the composition marker behaves as a protected region.

Type:

Boolean; read only.

Expression access to paths points on shapes, masks, and brush strokes (expression reference)

You can use expressions to read and write the x and y coordinates of path points, or vertices, for:

- Layer masks
- Bezier shapes
- Brush strokes on the Paint and Roto Brush & Refine Edge effects.

Expression methods:

- **Path points() method:** *{pathProperty}.points(t = time)* Get the x,y coordinates of all points on a path. Coordinates for layer mask path points are relative to the layer's origin in its upper-left hand corner. Coordinates for Bezier shape path points are are relative to the anchor point of the path's shape group for example, *Transform: Shape 1 > Anchor Point*. Coordinates for brush stroke path points are relative to the start of the stroke; the first point is [0,0]. Optionally specify the time at which to sample the path. You can pass this method into the *createPath()* method for the points parameter when duplicating a path.

Parameters:

t	Number, optional. The composition time (in seconds) at which to sample the path. Default is time (the current time).

Returns:

Array of number pair arrays, rounded to the fourth decimal place.

- **Path inTangents() method:** ***{pathProperty}.inTangents(t = time)*** Get the x,y coordinates of the incoming tangent handle for all points on a path. Tangent coordinate values are offset relative to the parent point's coordinates. i.e., The value [0,0] creates no curvature at the incoming tangent. This method can be passed into the *createPath()* method for the *inTangents* parameter when duplicating a path. Optionally specify the time at which to sample the path.

Parameters:

t	Number, optional. The composition time (in seconds) at which to sample the path. Default is time (the current time).

Returns:

Array of number pair arrays, rounded to the fourth decimal place.

- **Path outTangents() method:** ***{pathProperty}.outTangents(t = time)*** Get the x,y coordinates of the outgoing tangent handle for all points on a path. Tangent coordinate values are offset relative to the parent point's coordinates - The value [0,0] creates no curvature at the outgoing tangent.This method can be passed into the *createPath()* method for the *outTangents* parameter when duplicating a path. Optionally specify the time at which to sample the path.

Parameters:

t	Number, optional. The composition time (in seconds) at which to sample the path. Default is time (the current time).

Returns:

Array of number pair arrays, rounded to the fourth decimal place.

- **Path isClosed() method**: *{pathProperty}.isClosed()*Determines if the path is open or closed. Returns true if the path is closed, false if the path is open. This method can be passed into the *createPath()* method for the *is_closed* parameter when duplicating a path.

Parameters:

None

Returns:

Boolean

- **Path pointOnPath() method***{pathProperty}.pointOnPath(percentage = 0.5, t = time)*Get the x,y coordinates of an arbitrary point along a path.The point is expressed as a percentage of the arc-length of the path. 0% is the first point and 100% is the last point. When the path is closed, 0% and 100% will return the same coordinates. Percentage of arc-length is used to ensure uniform speed along the path. Other than 0% and 100%, percentages do not necessarily correlate with the Bezier points on the path - For a path with three points, the second point will not necessarily be at 50%. This also means that for an open path and closed path with identical points, the percentage along the open path will not return the same coordinates as the closed path due to the additional length of the closed path. Optionally specify the time at which to sample the path.

Parameters:

percentage	Number between 0 and 1, optional. The percentage along the arc-length of the path to sample. Values smaller than 0 and larger than 1 are clipped. Default is 0.5.
t	Number, optional. The composition time (in seconds) at which to sample the path. Default is time (the current time).

Returns:

A number pair array.

- **Path tangentOnPath() method** *{pathProperty}.tangentOnPath(percentage = 0.5, t = time)* Get the calculated x,y coordinates of the outgoing tangent handle for an arbitrary point along a path. Tangent coordinate values are offset relative to the parent point's coordinates - The value [0,0] creates no curvature at the outgoing tangent. The incoming tangent handle is the inverse of this value (multiply the x,y coordinates by -1). The tangent's parent point is expressed as a percentage of the arc-length of the path. The coordinates returned by *tangentOnPath()* are calcuated from it's parent point and will differ from those returned by *outTangents()* if a user-defined point also exists at that arc-length pecentage. The linear distance between the parent point's coordinates and *tangentOnPath()* coordinates will always be 1. You can multiply the returned coordinates to create a longer tangent, ex. *(myPath.tangentOnPath() * 100)*. Optionally specify the time at which to sample the path.

Parameters:

percentage	Number between 0 and 1, optional. The percentage along the arc-length of the path to sample. Values smaller than 0 and larger than 1 are clipped. Default is 0.5.
t	Number, optional. The composition time (in seconds) at which to sample the path. Default is time (the current time).

Returns:

A number pair array.

- **Path normalOnPath() method** *{pathProperty}.normalOnPath(percentage = 0.5, t = time)* Get the calculated x,y coordinates of the normal for an arbitrary point along a path.Coordinate values of normals are offset relative to the parent point's coordinates - The value [0,0] is the same as the parent point.The normal's parent point is expressed as a percentage of the arc-length of the path. Read the description of the *pointOnPath()* method for details about arc-length percentage.The coordinates returned by *normalOnPath()* are calcuated from its parent point. The linear distance between the parent point's coordinates and *normalOnPath()* coordinates will always be 1. You can multiply the returned coordinates to create a longer normal, for example, *(myPath.normalOnPath() * 100)*. Optionally specify the time at which to sample the path.

Parameters:

percentage	Number between 0 and 1, optional. The percentage along the arc-length of the path to sample. Values smaller than 0 and larger than 1 are clipped. Default is 0.5.
t	Number, optional. The composition time (in seconds) at which to sample the path. Default is time (the current time).

Returns:

A number pair array.

- **Path createPath() method** *{pathProperty}.createPath(points = [[0,0], [100,0], [100,100], [0,100]], inTangents = [], outTangents = [], is_closed = true)* Creates a path object from a set of points and tangents.The points are defined by an array of number pair arrays representing their x,y coordinates. The array length must be at least 1, and can be of any greater length.The incoming and outgoing tangent handles of the points are defined by an array of number pair arrays representing their x,y offset coordinates. The length of the tangent arrays must be exactly the same as the points paramater. Tangent coordinate values are offset relative to the parent point's coordinates - The *value [0,0]* creates no curvature at the incoming tangent. The *points()*, *inTangents()*, *outTangents()*, and *isClosed()* methods of a path can be passed into the points, inTangents, outTangents, and *is_closed* parameters to duplicate a path.The points and tangents of the same path can be passed into *createPath()* with modifications to generate a different result. For example, the following expression will remove curves from Mask 1 by not passing the *inTangents* or *outTangents* parameters:

myMask = mask("Mask 1").path; myMask.createPath(myMask.points());

The following example passes the points and tangents of Mask 1 and converts it to an open path by *setting is_closed* to false:

myMask = mask("Mask 1").path; myMask.createPath(myMask.points(), myMask.inTangents(), myMask.outTangents(), false);

points	An array of length 1 or greater containing number pair arrays representing the [x,y] coordinates of the path points. Required unless no parameters are passed (i.e., createPath()). Default is [[0,0], [100,0], [100,100], [0,100]].
is_closed	Boolean, optional. Determines if the mask is closed. If true, the last point will be connected to the first point. Default is true.
inTangents	An array containing number pair arrays representing the [x,y] offset coordinates of the outgoing tangent handles to the path points. Required unless no parameters are passed (i.e., createPath()). The array length must be the same as points, or you can pass an empty array ([]), which will assume the same length as points and [0,0] for all tangents. Default is an empty array.
outTangents	An array containing number pair arrays representing the [x,y] offset coordinates of the incoming tangent handles to the path points. Required unless no parameters are passed (i.e., createPath()). The array length must be the same as points, or you can pass an empty array ([]), which will assume the same length as points and [0,0] for all tangents. Default is an empty array.

Returns:

A path object.

Examples:

- Example 1

The example writes the list of point and tangent coordinates from Path 1 of Shape 1 on layer Shape Layer 1, at time=0, into a string. Apply this to the source text property of a text layer for a readout of the coordinates and incoming and outgoing tangents of the shape.

pointsList = ""; sampleTime = 0;*myShape = thisComp.layer("Shape Layer 1").content("Shape 1").content("Path 1").path;*

```
for (i = 0; i < myShape.points(sampleTime).length; i++) {     pointsList += "c: "
+ myShape.points(sampleTime)[i].toString() + "  i: " + myShape.inTangents(sampleTime)[i].toString() + " o: "
+ myShape.outTangents(sampleTime)[i].toString() + "\n"; }
```

pointsList;

- Example 2

The example reads the coordinates of the first vertex of Mask 1 on Dark Gray Solid 1 and converts them to composition coordinates. Apply this to a 2D point control of an effect, such as Write-on or CC Particle Systems II, to make the effect trace or track the first point of an animated mask. Duplicate the effect and change the path points index value ([0]) to trace or track the other points of the mask.

myLayer = thisComp.layer("Dark Gray Solid 1"); myLayer.toComp(myLayer.mask("Mask 1").maskPath.points()[0]);

Data-driven animation (expression reference)

Expression methods:

- **Footage sourceText attribute***{footageItem}.sourceText* Returns the contents of a .JSON file as a string. The eval() method can be used to convert the string to an array of sourceData objects, identical to the results of the sourceData attribute, from which the individual data streams can be referenced as hierarchal attributes of the data. For example:

var myData = eval(footage("sample.json").sourceText);

myData.sampleValue;

Type:

String, the contents of the .JSON file; read-only.

- **Footage sourceData attribute***{footageItem}.sourceData* Returns the data of a .JSON file as an array of sourceData objects. The structure of the .JSON file will determine the size and complexity of the array. Individual data streams can be referenced as hierarchal attributes of the data. For example, given a data stream named Color, the following will return the value of Color from the first data object: *footage("sample.json").sourceData[0].Color*

Typical use is to assign a .JSON file's sourceData to a variable, and then reference the desired data stream. For example:

var myData = footage("sample.json").sourceData;

myData[0].Color;

Type:

An array of sourceData objects; read-only.

- **Footage dataValue() method***{footageItem}.dataValue(dataPath)* Returns the value of specificed static or dynamic data stream in a .mgJSON file. Accepts a single array value to define the path in the hierarchy to the desired data stream. For example:

footage("sample.mgjson").dataValue([0]) returns data of the first child.

footage("sample.mgjson").dataValue([1][0]) returns data of the first child in the second group.

Parameters:

dataPath	Array, required. The path in the hierarchy to a static or dynamic data stream.

Returns:

The value of the data stream.

- **Footage dataKeyCount() method***{footageItem}.dataKeyCount(dataPath)*Returns the number of samples in a specificed dynamic data stream in a .mgJSON file.Accepts a single array value to define the path in the hierarchy to the desired dynamic data stream.

For example:

- *footage("sample.mgjson").dataKeyCount([0])* returns the count of samples for the first child
- *footage("sample.mgjson").dataKeyCount([1][0])* returns the count of samples for the second group

Parameters:

dataPath	Array, required. The path in the hierarchy to a static or dynamic data stream.

Returns:

The number of samples in the dynamic data stream.

- **Footage dataKeyTimes() method***{footageItem}.dataKeyTimes(dataPath, t0 = startTime, t1=endTime)*Returns the time in seconds for the samples of a specificed dynamic data stream in a .mgJSON file. Optionally specify the time span from which to return samples. By default the time for all samples between startTime and endTime in the dynamic data stream are returned, as defined by the data stream's samplesTemporalExtent property in the .mgJSON file. Accepts a single array value to define the path in the hierarchy to the desired dynamic data stream.

The following example returns the times of samples between 1 second and 3 seconds for the first child:

footage("sample.mgjson").dataKeyTimes([0], 1, 3)

Parameters:

dataPath	Array, required. The path in the hierarchy to a dynamic data stream.
t0	Number, optional. The start time, in seconds, of the span from which to return samples. Defaults to startTime.
t1	Number, optional. The end time, in seconds, of the span from which to return samples. Defaults to endTime.

Returns:

Array of numbers representing the sample times.

- **Footage dataKeyValues() method***{footageItem}.dataKeyValues(dataPath, t0 = startTime, t1=endTime)*Returns the values for the samples of a specificed dynamic data stream in a .mgJSON file. Optionally specify the time span from which to return samples. By default the time for all samples between startTime and endTime in the dynamic data stream are returned, as defined by the data stream's samplesTemporalExtent property in the .mgJSON file. Accepts a single array value to define the path in the hierarchy to the desired dynamic data stream.

For example:

footage("sample.mgjson").dataKeyValues([0], 1, 3) returns the values of samples between 1 second and 3 seconds for the first child.

Parameters:

dataPath	Array, required. The path in the hierarchy to a dynamic data stream.
t0	Number, optional. The start time, in seconds, of the span from which to return samples. Defaults to startTime.
t1	Number, optional. The end time, in seconds, of the span from which to return samples. Defaults to endTime.

Returns:

Array of numbers representing the sample values.

Hex to RGB color conversion method (expression reference)

This color conversion method, *hexToRgb()*, converts hexadecimal color values, for example, #FF00FF to RGBA color values. This can be useful to link color parameters to color values represented as hex strings in JSON or CSV/TSV data sources.

Expression method:

***hexToRgb*(hexString)** Converts a color in hex triplet space to RGB, or in hex quartet space to RGBA space. For hex triplets, alpha defaults to 1.0.

Parameters:

hexString	String representing an hex triplet (6 digits, no alpha channel) or quartet (8 digits, includes alpha channel) containing only numerals or characters A–F. Optional leading characters 0x, 0X, or # are ignored. Characters beyond 8 digits are ignored.

Returns:

RGBA color value array.

Examples:

Any of the following will return [1.0, 0.0, 1.0, 1.0]:

- hexToRgb("FF00FF")
- hexToRgb("#FF00FF")
- hexToRgb("0xFF00FF")
- hexToRgb("0XFF00FFFF") Note: 8-digit hex quartet; last two digits set alpha to 1.0.

Expression examples

Many of the examples in this section are based on expressions provided by Dan Ebberts.

Online resources for expression examples

Dan Ebberts provides example expressions and tutorials for learning how to work with expressions on his MotionScript website. For example, Dan provides an excellent page about collision detection.

Colin Braley provides a tutorial and example project on his website that show how to use expressions to make one layer repel others in a natural-seeming manner.

The AE Enhancers forum provides many examples and much useful information about expressions, as well as scripts and animation presets. In this post on the AE Enhancers forum, Paul Tuersley provides a tutorial and example project that show how to use expressions to animate several layers in a swarm.

Rick Gerard provides an example on his website that demonstrates rolling a square object along a floor so that the sides stay in contact with the floor plane.

Carl Larsen provides a video tutorial on the Creative COW website that demonstrates how to use expressions and parenting to relate the rotation of a set of wheels to the horizontal movement of a vehicle.

Chris Zwar provides an example project on his website for automatically arranging still images or videos into a grid (like a video wall). You can easily adjust position and spacing with sliders that are connected to a system of expressions. There are three compositions in the project—one for stills, one for videos, and one to create an auto-storyboard in which a video is sampled at user-defined intervals and aligned into a grid.

JJ Gifford's website provides several example projects that demonstrate how to use expressions.

Maltaannon (Jerzy Drozda, Jr.) provides a video tutorial on his website that shows how to use expressions to create a volume meter using the results of the Convert Audio To Keyframes command.

Harry Frank provides a tutorial on his graymachine website that shows how to use expressions to read data from an external text file.

Expression example: Make a layer revolve in a circle

You can create an expression without using properties from other layers. For example, you can make a layer revolve in a perfect circle.

1. Select a layer, press P to reveal its Position property in the Timeline panel, and Alt-click (Windows) or Option-click (Mac OS) the stopwatch to the left of the property name.
2. Enter the following in the expression field:

```
[(thisComp.width/2), (thisComp.height/2)] + [Math.sin(time)*50, -Math.cos(time)*50]
```

Expression example: Rotate the hands of a clock

You can use the pick whip to link rotation values between layers to animate the hands on a clock—as the hour hand moves from hour to hour, the minute hand rotates the full circumference of the clock face. This type of animation would take a long time to create if you had to set each keyframe for both hand layers, but with the pick whip, you can do it in a matter of minutes.

1. Import or create two long, narrow solid-color layers: an hour hand and a minute hand. (See Solid-color layers and solid-color footage items.)
2. Set the anchor points at the ends of the layers. (See Layer anchor points.)
3. Move the layers so that the anchor points are at the center of the composition. (See Move layers in space.)
4. Set Rotation keyframes for the hour hand. (See Set or add keyframes.)
5. Select the Rotation property for the minute hand and choose Animation > Add Expression.
6. Drag the pick whip to the Rotation property for the hour hand. The following expression appears:

```
thisComp.layer("hour hand").rotation
```

7. To make the minute hand rotate 12 times as fast as the hour hand, add **12* at the end of the expression as follows:

```
thisComp.layer("hour hand").rotation*12
```

Expression example: Position one layer between two others

This example expression positions and maintains one layer at a balanced distance between two other layers.

1. Start with three layers. (See Creating layers.)
2. Animate the positions of the first two layers in the Timeline panel. (See Motion paths.)
3. Select the third layer, press P to reveal the Position property, and Alt-click (Windows) or Option-click (Mac OS) the stopwatch button to the left of the property name.
4. Enter the following in the expression field:

```
(thisComp.layer(1).position + thisComp.layer(2).position)/2
```

Expression example: Create a trail of images

This example expression instructs a layer to be at the same position as the next higher layer in the Timeline panel, but delayed by a specified amount of time (in this case, 0.5 seconds). You can set similar expressions for the other geometric properties.

1. Start with two solid-color layers that are scaled to approximately 30% of the composition size. (See Solid-color layers and solid-color footage items.)
2. Animate the position of the first layer. (See Motion paths.)
3. Select the second layer, press P to reveal the Position property, and Alt-click (Windows) or Option-click (Mac OS) the stopwatch button to the left of the property name.
4. Enter the following in the expression field:

```
thisComp.layer(thisLayer, -1).position.valueAtTime(time - .5)
```

5. Duplicate the last layer five times by selecting it and pressing Ctrl+D (Windows) or Command+D (Mac OS) five times.

All layers follow the same path, and each is delayed 0.5 seconds from the previous.

Dan Ebberts provides more examples and techniques for creating trails of images on his MotionScript website.

Expression example: Create a bulge between two layers

This example expression synchronizes the Bulge Center argument of the Bulge effect in one layer with the position of another layer. For example, you can create an effect that looks like a magnifying glass moving over a layer, with the contents under the magnifying glass bulging as the lens (that is, the overlying layer) moves. This expression uses the *fromWorld* method, which makes the expression work correctly regardless of whether you move the magnifying glass layer or the underlying layer. You can rotate or scale the underlying layer, and the expression stays intact.

You can also use other effects, such as Ripple, with this expression.

1. Start with two layers. Make one layer a magnifying glass or similar object with a hole in the middle and name it Magnifier. (See Creating layers.)
2. Animate the position of the magnifying glass layer. (See Motion paths.)
3. Apply the Bulge effect to the other layer. (See .)
4. Select the Bulge Center property of the Bulge effect in the Timeline panel and choose Animation > Add Expression, or Alt-click (Windows) or Option-click (Mac OS) the stopwatch button for the property.
5. Select the default expression text and type the following:

```
fromWorld(thisComp.layer("Magnifier").position)
```

Expression example: Fade opacity of a 3D layer based on distance from camera

? Apply the following expression to the Opacity property of a 3D layer:

```
startFade = 500; // Start fade 500 pixels from camera.
endFade = 1500;  // End fade 1500 pixels from camera.
try
{ // Check whether there's a camera
    C = thisComp.activeCamera.toWorld([0,0,0]);
}
catch(err)
{ // No camera, so assume 50mm
    w = thisComp.width * thisComp.pixelAspect;
    z = (w/2)/Math.tan(degreesToRadians(19.799));
    C = [0,0,-z];
}
P = toWorld(anchorPoint);
d = length(C,P);
linear(d,startFade,endFade,100,0)
```

The fade starts at a distance of 500 pixels from the camera and is complete at 1500 pixels from the camera. The *linear* interpolation method is used to map distance values to opacity values.

Expression example: Make a 3D layer invisible if facing away from camera

? Apply the following expression to the Opacity property of a 3D layer:

```
if (toCompVec([0, 0, 1])[2] > 0 ) value else 0
```

Dan Ebberts explains this expression on his MotionScript website.

Expression example: Flip layer horizontally if facing away from camera

? Apply the following expression to the Scale property of a 3D layer:

```
if (toCompVec([0, 0, 1])[2] > 0 ) value else [-value[0], value[1], value[2]]
```

Expression example: Animate scale at each layer marker

? Apply the following expression to a Scale property to make a layer wobble at each marker:

```
n = 0;
t = 0;
if (marker.numKeys > 0){
    n = marker.nearestKey(time).index;
    if (marker.key(n).time > time) n--;
}
if (n > 0) t = time - marker.key(n).time;

amp = 15;
freq = 5;
decay = 3.0;

angle = freq * 2 * Math.PI * t;
scaleFact = (100 + amp * Math.sin(angle) / Math.exp(decay * t)) / 100;
[value[0] * scaleFact, value[1] / scaleFact];
```

Expression example: Start or stop wiggle at specific time

You can use any expression in place of the *wiggle* expression used here, to begin and end the influence of any expression at a specific time.

Apply the following expression to a property to wiggle it beginning at time 2 seconds:

```
timeToStart = 2;
if (time > timeToStart)
{
 wiggle(3,25);
}
else
{
 value;
}
```

Apply the following expression to a property to stop wiggling it at time 4 seconds:

```
timeToStop = 4;
if (time > timeToStop)
{
 value;
}
else
{
 wiggle(3,25);
}
```

Apply the following expression to a property to start wiggling it at time 2 seconds and stop wiggling it at time 4 seconds:

```
timeToStart = 2;
timeToStop = 4;
if ((time > timeToStart) && (time < timeToStop))
{
 wiggle(3,25);
}
else
{
 value;
}
```

Expression example: Match camera focal plane to another layer

? Apply the following expression to the Focus Distance property of a camera layer to have its focus distance match the distance to the anchor point of a layer named “target”:

```
target = thisComp.layer("target");
V1 = target.toWorld(target.anchorPoint) - toWorld([0,0,0]);
V2 = toWorldVec([0,0,1]);
dot(V1,V2);
```

Dan Ebberts explains this expression example in detail on his Motionscript website.

Syntax differences between the JavaScript and Legacy ExtendScript expression engines

Refer to this document to learn how to improve your expressions for the JavaScript expression engine, or when fixing errors that occur when expressions written for previous releases of After Effects fail to evaluate in the JavaScript expression engine.

The expression language in After Effects is based on JavaScript, which is an implementation of ECMAScript. The JavaScript expression engine in After Effects 16.0 is based on ECMAScript 2018. The Legacy ExtendScript expression engine is based on ECMAScript 3 (1999). (Adobe ExtendScript is also the language used for scripting in After Effects and other Adobe applications.)

You can follow the examples provided below, as well as guidance for how to author expressions that work in both the JavaScript and Legacy ExtendScript expression engines.

The core differences between the JavaScript and Legacy ExtendScript expression engines are:

- **Modern JavaScript syntax: Improvements made to the expression language:** Additions made to JavaScript in ECMAScript 5 through ECMAScript 2018 allow for new syntax and methods in expressions when using the JavaScript expression engine. Also, some small improvements have been made to the expression syntax when using the JavaScript expression engine. Here are some core differences:
  - Expressions can use JavaScript syntax from ECMAScript 2018
  - .value is no longer required when linking to other properties from Source Text
  - Freezing property values with posterizeTime(0)
- **Incompatible Legacy Syntax:** Some legacy syntax is not compatible with the JavaScript expression engine. These exceptions are documented here, along with the changes needed to make non-working syntax compatible with the JavaScript engine. Here are some core differences:
  - if...else syntax differences
  - if and else cannot be on the same line without brackets
  - Expressions cannot end in a function declaration
  - this() shorthand syntax is not allowed; use thisLayer() instead
  - Source Text property array-index access to characters requires .value
  - Snake case properties and methods are not allowed
  - Using eval() with binary-encoded (.jsxbin) expressions
  - Limited support for the $. (Dollar) object
  - No support for ...reflect.properties, ...reflect.methods, and toSource()
- **Syntax Requirements for .jsx Expression Libraries and eval() with the JavaScript Engine:** When using expressions inside a .jsx expression function library or when an expression is called inside *eval()*, *thisLayer.* and t*hisProperty.* need to be explicitly called on, and math operations on arrays needs to be replaced with vector math. Here are some core differences:
  - Explicitly prefix native methods and attributes with thisLayer. or thisProperty.
  - Replacing math operators with vector math functions

Modern JavaScript syntax: Improvements made to the expression language

Expressions can use JavaScript syntax from ECMAScript 2018

Many additions have been made to the JavaScript language since ECMAScript 3. There are new methods to use with strings, arrays, and objects which are more compact and readable. There are also new ways to declare variables and functions, as well as default parameters, spread operators and more. This document does not cover these changes, as they are general to the JavaScript language. Resources for learning about the many syntax additions can be found at the following links:

- JavaScript ES5 Guide (aka ECMAScript 5)
  - New Array methods
  - New Object methods
  - *JSON.stringify()* & *JSON.parse()*
- JavaScript ES6 Guide (aka ECMAScript 2015)
  - let and const
  - Arrow functions
  - The spread operator
- ECMAScript 2016 Guide
  - Array.includes()
  - Exponentiation Operator
- ECMAScript 2017 Guide
  - String padding
  - Trailing commas
- ECMAScript 2018 Guide
  - Rest/Spread Properties for Objects

Additional recommended, in-depth resources for learning JavaScript:

- Mozilla's MDN JavaScript Web Docs
- w3schools' JavaScript Tutorials

.value is no longer required when linking to other properties from Source Text

When referencing another property value from a Source Text property, the Legacy ExtendScript engine requires *.value* to be added at the end of the property. The JavaScript engine shows the value of the property by default unless another attribute like *.propertyIndex* or *.name* is explicitly used.

For example:

```
thisComp.layer("Solid 1").transform.position

// In the Legacy engine, this evaluates to "[object Property]" when applied to a Source Text
property.
// In the JavaScript engine, this evaluates to the value of the Position property of layer
"Solid 1" when applied to a Source Text property.
```

Freezing property values with posterizeTime(0)

In After Effects 16.0, *posterizeTime(0)* freezes the property value at time 0 in the composition. This applies to both the JavaScript and Legacy ExtendScript engines.

Note:

This is not backward-compatible and may cause unexpected results in After Effects versions prior to 16.0.

Incompatible Legacy Syntax

Nearly all of the expression syntax from the Legacy ExtendScript expression engine is forward-compatible with the JavaScript expression engine. However, there is some legacy syntax which is not compatible with the JavaScript expression engine. Sometimes this is caused by syntax changes in modern JavaScript. In other cases, obsolete or outdated syntax has been removed. Examples of non-working and working syntax are provided below.

Most of these syntax difference can be corrected via application scripting that re-writes the expressions.

if...else syntax differences

In general, it is recommended to always write *if...else* statements with line breaks and brackets in accordance with MDN guidelines. The Legacy ExtendScript engine was tolerant of loose syntax in *if...else* statements, however the JavaScript engine is strict. Incorrect *if...else* syntax fails to evaluate when using the JavaScript engine.

Ending an expression in an if statement without an else is not allowed

When an expression ends with an *if* statement without an *else* statement, the JavaScript engine will fail to evaluate the expression with the error "Undefined value used in expression (could be an out of range array subscript?)". In the Legacy ExtendScript engine, the following expression evaluates to 100 if the time is greater than 1 second, else it evaluates to 50:

```
var x = 50;
if ( time > 1 ) {
   x = 100
}
// The "else" here is implied but not stated.
```

The JavaScript engine needs the *else* portion of the statement to be explicitly stated if it is the last statement in the expression:

```
var x = 50;
if ( time > 1 ) {
   x = 100;
} else {
   x;
}
```

This will evaluate correctly in both the JavaScript engine and the Legacy ExtendScript engine.

if and else cannot be on the same line without brackets

An *if...else* statement on a single line without brackets evaluates in the Legacy ExtendScript engine, but fails to evaluate in the JavaScript engine with an error such as "Syntax Error: Unexpected token else" or "Undefined value used in expression (could be an out of range array subscript?)". The error varies, depending on the context and property type.

In the Legacy ExtendScript engine, the following expression evaluates to 100 if the time is greater than 1 second, else it evaluates to 50:

```
if ( time > 1 ) 100 else 50;
```

The JavaScript engine requires line breaks or brackets to evaluate *if...else* statements. For simple cases, the ternary operator may be used instead. Any of the following syntax can be used with the JavaScript engine:

```
// Solution A: adding a line break before "else" will allow both engines to evaluate correctly.

if ( time > 1 ) 100
else 50;

// Solution B: adding correct bracketing will also allow both engines to evaluate correctly.

if ( time > 1 ) { 100 } else { 50 };

// Solution C: Use a ternary operator in place of the if...else statement, which also evaluates
correctly in both engines.

time > 1 ? 100 : 50;
```

All of the above solutions evaluate correctly in both the JavaScript engine and the Legacy ExtendScript engine.

Expressions cannot end in a function declaration

If an expression ends with a function declaration, the JavaScript engine fails to evaluate the expression with the error "Object of type found where a Number, Array, or Property is needed". In the JavaScript engine, the last item evaluated must return a value, rather than declare one.

The following example works in the Legacy engine, but not the JavaScript engine:

```
timesTen( value );  // The Legacy engine evaluates this line, even though the function is
declared below.

function timesTen ( val ) {
   return val * 10
}
```

When a function is called as the last line (instead of the declaration), the expression will evaluate correctly in both engines:

```
function timesTen ( val ) {
   return val * 10
}

timesTen( value );  // The JavaScript engine needs the function call to happen below the
declaration in order to return the correct value.
```

this() shorthand syntax is not allowed; use thisLayer() instead

In the Legacy ExtendScript engine, *this* was allowed to be used as shorthand for *thisLayer.* In the JavaScript engine, *this* refers to the global object and *thisLayer* must be used instead. Using *this* in the JavaScript engine will usually result in the error "*this is not a function*".

In the following Legacy ExtendScript example, *this* is used to create a compact link to a Text Layer Position property from the Source Text property:

```
this(5)(2).value;
```

In the JavaScript engine, *this* must be replaced by *thisLayer*:

```
thisLayer(5)(2).value;
```

Using *thisLayer* is compatible with both expression engines.

Source Text property array-index access to characters requires .value

In the Legacy ExtendScript expression engine, the characters of a text property could be accessed with bracket notation like an array:

```
text.sourceText[0]     // Returns the first character of the Source Text property's text value.
```

In the JavaScript engine, *.value* must be added in order to access the characters:

```
text.sourceText.value[0]    // Returns the first character of the Source Text property's text
value.
```

This syntax is compatible with both engines.

Snake case properties and methods are not allowed

The deprecated snake case properties and methods (written with an underscore instead of camelCase) are not supported by the JavaScript engine. The camelCase versions should be used instead as they are compatible with both engines. The following is a list of the deprecated snake case and their corresponding camelCase.

Snake case properties	camelCase properties	Snake Case methods	camelCase Methods
this_comp	*thisComp*	*value_at_time()*	*valueAtTime()*
this_layer	*thisLayer*	*velocity_at_time()*	*velocityAtTime()*
this_property	*thisProperty*	*speed_at_time()*	*speedAtTime()*
color_depth	*colorDepth*	*nearest_key()*	*nearestKey()*
has_parent	*hasParent*	*posterize_time()*	*posterizeTime()*
in_point	*inPoint*	*look_at()*	*lookAt()*
out_point	*outPoint*	*seed_random()*	*seedRandom()*
start_time	*startTime*	*gauss_random()*	*gaussRandom()*
has_video	*hasVideo*	*ease_in()*	*easeIn()*
has_audio	*hasAudio*	*ease_out()*	*easeOut()*
audio_active	*audioActive*	*rgb_to_hsl()*	*rgbToHsl()*
anchor_point	*anchorPoint*	*hsl_to_rgb()*	*hslToRgb()*
audio_levels	*audioLevels*	*degrees_to_radians()*	*degreesToRadians()*
time_remap	*timeRemap*	*radians_to_degrees()*	*radiansToDegrees()*
casts_shadows	*castsShadows*	*from_comp_to_surface()*	*fromCompToSurface()*
light_transmission	*lightTransmission*	*to_comp_vec()*	*toCompVec()*
accepts_shadows	*acceptsShadows*	*from_comp_vec()*	*fromCompVec()*
accepts_lights	*acceptsLights*	*to_world_vec()*	*toWorldVec()*
frame_duration	*frameDuration*	*from_world_vec()*	*fromWorldVec()*
shutter_angle	*shutterAngle*	*to_comp()*	*toComp()*
shutter_phase	*shutterPhase*	*from_comp()*	*fromComp()*
num_layers	*numLayers*	*to_world()*	*toWorld()*
pixel_aspect	*pixelAspect*	*from_world()*	*fromWorld()*
point_of_interest	*pointOfInterest*	*temporal_wiggle()*	*temporalWiggle()*
depth_of_field	*depthOfField*	*loop_in_duration()*	*loopInDuration()*
focus_distance	*focusDistance*	*loop_out_duration()*	*loopOutDuration()*
blur_level	*blurLevel*	*loop_in()*	*loopIn()*
cone_angle	*coneAngle*	*loop_out()*	*loopOut()*
cone_feather	*coneFeather*		
shadow_darkness	*shadowDarkness*		
shadow_diffusion	*shadowDiffusion*		
active_camera	*activeCamera*		

Using eval() with binary-encoded (.jsxbin) expressions

Expressions encoded in the ExtendScript binary format (saved as a binary .jsxbin file from ExtendScript ToolKit CC) are not supported by the JavaScript engine.

If you want to obfuscate an expression, use the Legacy ExtendScript engine or use a different obfuscation method that is compatible with ECMAScript 2018. Some obfuscation methods might not be compatible with both expression engines.

Limited support for the $. (Dollar) object

The $. (Dollar) object methods and properties are specific to ExtendScript and mostly not supported in the JavaScript engine. This table lists unsupported and supported uses of the $. (Dollar) object:

Unsupported $.	Supported $.
$.fileName	*$.build*
$.hiResTimes	*$.engineName (this is unsupported in the Legacy ExtendScript engine)*
$.stack	*$.global*
$.evalFile()	
$.list()	
$.setenv()	
$.getenv()	
$.appEncoding	
$.buildDate	
$.decimalPoint	
$.dictionary	
$.error	
$.flags	
$.includePath	
$.level	
$.line	
$.locale	
$.localize	
$.memCache	
$.os	
$.screens	
$.strict	
$.version	

No support for ...reflect.properties, ...reflect.methods, and toSource()

reflect.properties and *reflect.methods* are not supported in the JavaScript engine; they are ExtendScript-specific methods which have no direct equivalent in JavaScript.

toSource() in JavaScript has been deprecated and is not part of any standards track.

To see a list of available properties and methods for any given After Effects property similar to what was provided by the above methods, use the following expression on a Source Text property and link it to your desired property, for example, using the pick whip in place of *thisProperty* on line 1:

```
let obj = thisProperty;     // Replace "thisProperty" with a property-link to your desired
property.
let props = [];

do {
   Object.getOwnPropertyNames(obj).forEach(prop => {
       if (props.indexOf(prop) === -1) {
           props.push(prop);
       }
   });
} while (obj = Object.getPrototypeOf(obj));

props.join("\n");          // Returns an array of strings listing the properties and methods
available.
```

The above expression is not compatible with the Legacy ExtendScript engine. It uses syntax and methods not available in ECMAScript 3.

Syntax Requirements for .jsx Expression Libraries and eval() with the JavaScript Engine

When using expressions inside a .jsx expression function library or when an expression is called inside *eval()*, certain syntax needs to be modified:

An explicit *thisLayer.* or *thisProperty.* prefix needs to be added to any native method or attribute which is not explicitly called on a layer or property. The prefix tells the JavaScript engine which object you are calling the method or attribute on.

Math operations on array values like Position needs to be calculated using vector math or by using looping functions to act on every item in the array. Overloaded math operators like position + [100,100] will not evaluate.

When using the JavaScript engine, expressions are pre-processed before evaluation in order to make some of the Legacy ExtendScript expression syntax readable by the new engine. However, these pre-processing tasks are not performed when evaluating expressions from a .jsx expression function library or when an expression is called inside *eval()*. The above syntax modifications must be made manually for these cases. All of these syntax modifications are backward-compatible with the Legacy ExtendScript engine, so a .jsx expression library written to work with the JavaScript engine will also work with the Legacy ExtendScript engine.

Performance tip: Due to the lack of pre-processing, calling complex expressions from a .jsx library with this syntax and the JavaScript engine may see a performance improvement, compared to calling the same expression directly on a property.

Explicitly prefix native methods and attributes with thisLayer. or thisProperty.

The following table lists the methods and attributes that require a prefix. For example, time must be written as *thisLayer.time*, while *wiggle()* must be written as *thisProperty.wiggle()*.

These prefixes are only required in cases when the attribute or method isn't already being explicitly called on another layer or property. For instance, when calling *thisComp.layer(1).hasParent*, adding *thisLayer.* is not required because *.hasParent* is already being explicitly called on *layer(1)*.

Methods Requiring *thisLayer.*	Attributes Requiring *thisLayer.*	Methods Requiring *thisProperty.*	Attributes Requiring *thisProperty.*
comp() footage() posterizeTime() add() sub() mul() div() clamp() length() dot() normalize() cross() lookAt() timeToFrames() framesToTime() timeToTimecode() timeToFeetAndFrames() timeToNTSCTimecode() timeToCurrentFormat() seedRandom() random() gaussRandom() noise() degreesToRadians() radiansToDegrees() linear() ease() easeIn() easeOut() rgbToHsl() hslToRgb() hexToRgb() mask() sourceRectAtTime() sourceTime() sampleImage() toComp() fromComp() toWorld() fromWorld() toCompVec() fromCompVec() toWorldVec() fromWorldVec() fromCompToSurface()	time source thisProject colorDepth transform anchorPoint position scale rotation opacity orientation rotationX rotationY rotationZ lightTransmission castsShadows acceptsShadows acceptsLights ambient diffuse specular specularIntensity shininess specularShininess metal audioLevels timeRemap marker name width height index parent hasParent inPoint outPoint startTime hasVideo hasAudio active enabled audioActive cameraOption pointOfInterest zoom depthOfField focusDistance aperature blurLevel irisShape irisRotation irisRoundness irisAspectRatio irisDiffractionFringe highlightGain highlightThreshold highlightSaturation lightOption intensity color coneAngle coneFeather shadowDarkness shadowDiffusion	valueAtTime() velocityAtTime() speedAtTime() wiggle() temporalWiggle() smooth() loopIn() loopOut() loopInDuration() loopOutDuration() key() nearestKey() propertyGroup() points() inTangents() outTangents() isClosed() pointsOnPath() tangentOnPath() normalOnPath() createPath()	velocity speed numKeys propertyIndex

Replacing math operators with vector math functions

Both the JavaScript and LegacyExtendScript engines allow overloading math operators for arrays by using syntax like *position + [100,100]*, but this does not work for expressions inside a .jsx expression function library or inside *eval()*.

In order to perform math on array properties like Position, Scale, etc., the vector math equivalents should be used for addition, subtraction, multiplication, and division. The vector math functions will also work for regular numbers, so a function which might be called on properties of either data type should use the vector math functions.

Note:

The thisLayer. prefix must be used with the vector math functions.

- Addition: *thisLayer.add(vec1, vec2)*
- Subtraction: *thisLayer.sub(vec1, vec2)*
- Multiplication: *thisLayer.mul(vec, amount)*
- Division: *thisLayer.div(vec, amount)*

Below are examples of expressions using standard math and updated vector math. The vector math expressions also use the appropriate *thisLayer.* or *thisProperty.* prefix when needed.

To find the difference between a *wiggle()* and the value of a Position property:

```
// Standard Math:
wiggle() - value;


// Vector Math:
thisLayer.sub( thisProperty.wiggle(), value );
```

To interpolate between two values, similar to *linear()*, but with an extended range beyond the defined minimum and maximum:

```
// Standard Math:
value1 + ( ( t - tMin ) / ( tMax - tMin ) ) * ( value2 - value1 );


// Vector Math:
thisLayer.add( value1, thisLayer.mul( thisLayer.div( thisLayer.sub( t, tMin ), thisLayer.sub(
tMax, tMin ) ), thisLayer.sub( value2, value1 ) ) );
```

To loop a Position property in and out:

```
// Standard Math:
loopIn( "cycle" ) + loopOut( "cycle" ) - value;


// Vector Math:
thisLayer.sub( thisLayer.add( thisProperty.loopIn( "cycle" ), thisProperty.loopOut( "cycle" )
), value );
```

Plug-ins

Plug-ins are small software modules—with filename extensions such as .aex, .pbk, .pbg, and .8bi—that add functionality to an application. Effects in After Effects are implemented as plug-ins, as are some features for importing and working with certain file formats. The Photoshop Camera Raw plug-in, for example, provides After Effects with its ability to work with Camera Raw files.

Install and load plug-ins

You can obtain plug-ins for After Effects and other Adobe products from Adobe or other vendors. For specific instructions for installing a plug-in, see its documentation.

When After Effects starts, it loads plug-ins from several folder, including the Plug-ins folder. If a plug-in doesn't come with an installer or with specific instructions for its installation, then you can usually install the plug-in by placing it in the Plug-ins folder.

By default, the Plug-ins folder is in the following location:

- (Windows) Program Files\Adobe\Adobe After Effects <version>\Support Files
- (Mac OS) Applications/Adobe After Effects <version>

Several plug-ins come with After Effects and are automatically installed in the Plug-ins folder.

When loading plug-ins, After Effects ignores the contents of folders with names that begin and end in parentheses; for example, the contents of the folder (archived_effects) are not loaded.

After Effects also loads plug-ins from a MediaCore folder, which is intended to hold plug-ins shared between After Effects and Premiere Pro. Some third-party plug-in installers install their plug-ins in this folder. In general, unless specifically instructed to do so, don't install plug-ins in the MediaCore folder. If you install a plug-in in this folder that is not supported by one or more of the applications that read from this folder, you may encounter errors or other problems.

Note:

(Mac OS) Some third-party plug-in installers incorrectly install their plug-ins into the Mac OS X Package for After Effects. To reveal these plug-ins, Control-click the After Effects application icon in the Finder and choose Show Package Contents. You can then move the plug-ins into the After Effects Plug-ins folder.

When exchanging After Effects projects between computer systems, make sure that the plug-ins that the project depends on are installed on both systems. Similarly, if you're rendering a composition with multiple computers on a network, make sure that all plug-ins used in the composition are installed on all rendering computers.

On Mac OS, press Command+Option+Shift+Help to generate a list of all plug-ins loaded into After Effects (including version numbers). For information on using this command on Windows or with a Macintosh keyboard that doesn't have a Help button, see Todd Kopriva's blog on the Adobe website.

Third-party plug-ins included with After Effects

After Effects comes with several third-party plug-ins.

Foundry Keylight Keylight installs its documentation in the plug-in's subfolder in the Plug-ins folder. For more information, see Keying effects, including Keylight.

Synthetic Aperture Color Finesse Color Finesse installs its documentation in the plug-in's subfolder in the Plug-ins folder. For more information, see Resources for Synthetic Aperture Color Finesse.

fnord ProEXR Documentation for ProEXR plug-ins is available in a PDF document on the fnord website. For more information, see .

CycoreFX HD CycoreFX HD is included in the installation of After Effects CC. There is 16-bpc support in all effects, and 32-bpc (float) support in the effects. ICycoreFX HD plug-ins have support for motion blur, lights, more controls, and options.

For more information, see Resources for Cycore FX (CC) effects.

Imagineer mocha shape AE Documentation for the mocha shape for After Effects (mocha shape AE) plug-in is available on the Imagineer website.

Note:

Unlike the similarly named mocha shape for After Effects (mocha shape AE), Imagineer mocha-AE is not a plug-in; it is a separate, standalone planar tracker application. For more information, see Resources for mocha for After Effects (mocha-AE).

C/C++ plug-ins and the After Effects SDK

Many plug-ins for After Effects are written in the C/C++ programming language using the After Effects SDK. Effect plug-ins written with C/C++ have the filename extension .aex. For information on developing plug-ins for After Effects with the C/C++ SDK, go to the After Effects Developer Center section of the Adobe website.

Kas Thomas provides a tutorial on the MacTech website that shows step by step how to write an After Effects plug-in.

To ask questions about writing plug-ins with the C/C++ SDK for After Effects, go to the After Effects SDK user-to-user forum.

Where to find more plug-ins for After Effects

For information on plug-ins available for After Effects, go to the After Effects plug-in page on the Adobe website and the Toolfarm website.

To find plug-ins, scripts, projects, and other useful items, go to the Adobe Add-ons page.

For other sources of plug-ins, see After Effects community resources on the Adobe website.

Automation

After Effects and other Adobe software with which it's integrated provide many different means for automating various processes.

You can automate animation and image processing within After Effects with expressions, scripts, and plug-ins. You can automate rendering with aerender, network rendering, and post-render actions. You can also automate some tasks using workflow automation scripts in Adobe Bridge. Because you can exchange data easily between Photoshop and After Effects, you can use macros, actions, droplets, and scripts in Photoshop to automate the processing of images for use in After Effects.

Scripts

A script is a series of commands that tells an application to perform a series of operations. You can use scripts in most Adobe applications to automate repetitive tasks, perform complex calculations, and even use some functionality not directly exposed through the graphical user interface. For example, you can direct After Effects to reorder the layers in a composition, find and replace source text in text layers, or send an email message when rendering is complete.

After Effects scripts use the Adobe ExtendScript language, which is an extended form of JavaScript. ExtendScript files have the *.jsx* or *.jsxbin* filename extension.

For a description of the scripting capabilities available with After Effects, see the After Effects Scripting Guide on the After Effects Developer Center.

Load and run scripts

When After Effects starts, it loads scripts from the Scripts folder. By default, the Scripts folder is in the following locations for After Effects:

- (Windows) Program Files\Adobe\Adobe After Effects <version>\Support Files
- (Mac OS) Applications/Adobe After Effects <version>

Scripts are also installed in user locations starting with After Effects CC 12.1.

Several scripts come with After Effects and are automatically installed in the Scripts folder.

Loaded scripts are available from the File > Scripts menu. If you edit a script while After Effects is running, you must save your changes for the changes to be applied. If you place a script in the Scripts folder while After Effects is running, you must restart After Effects for the script to appear in the Scripts menu, though you can immediately run the new script using the Run Script File command.

Scripts in the ScriptUI Panels folder are available from the bottom of the Window menu. If a script has been written to provide a user interface in a dockable panel, the script should be put in the ScriptUI folder. ScriptUI panels work much the same as the default panels in the After Effects user interface.

Note:

By default scripts are not allowed to write files or send or receive communication over a network. To allow scripts to write files and communicate over a network, choose Edit > Preferences > General (Windows) or After Effects > Preferences > General (Mac OS), and select the Allow Scripts To Write Files And Access Network option.

- To run a loaded script, choose File > Scripts > [script name].
- To run a script that has not been loaded, choose File > Scripts > Run Script File, locate and select a script, and click Open.
- To stop a running script, press Esc.
- To run a script from the command line, call afterfx.exe from the command line. Use the *-r* switch and the full path of the script to run as arguments. This command does not open a new instance of the After Effects application; it runs the script in the existing instance.

  Example (for Windows):

afterfx -r c:\\script_path\\example_script.jsx

You can use this command-line technique—together with the software that comes with a customizable keyboard—to bind the invocation of a script to a keyboard shortcut.

You can view the list of ten most recently run scripts in After Effects. To view the list, select **File > Scripts > Recent Script Files**.

To rerun any of the ten most recently run scripts, press *Cmd+Option+Shift+D* (macOS) or *Ctrl+Alt+Shift+D* (Win).

Jeff Almasol provides a script that creates a simple console panel. The console panel includes a text area in which you can enter ExtendScript commands to be evaluated. There is no capturing of errors or messages; this console is only a simple way of entering commands without having to create a script first. For information, see Jeff Almasol's redefinery website.

On the AE Scripts website, Lloyd Alvarez offers a tip on how to run .jsxbin scripts if you don't have access to the Scripts or ScriptUI Panels folder.

Scripts included with After Effects

After Effects provides several prewritten scripts to assist you in performing common tasks, and to provide a basis for you to modify and create your own scripts.

Run the sample script Demo Palette.jsx to get an idea of what sorts of things you can do with scripts.

Write and modify scripts

You can write your own scripts for use in After Effects by using the script editor, which is part of the ExtendScript Toolkit. The ExtendScript Toolkit provides a convenient interface for creating, debugging, and testing your own scripts. Sometimes, all that you need to do is make a slight modification to an existing script to make it do what you want; such slight modifications can often be performed with little knowledge of computer programming and scripting languages.

See the After Effects scripting guide for more information.

To start the script editor, choose **File > Scripts > Open Script Editor**.

A tutorial on the AE Enhancers forum leads the reader step by step through the creation of a script.

Jeff Almasol provides a set of scripting utilities—such as useful functions—to facilitate the creation of your own scripts on his redefinery website.

David Torno provides a list of matchnames for After Effects scripts.

Scripting access

Motion Graphics templates scripting access

Scripts can add properties to the Essential Graphics panel and export a Motion Graphics template, using the following scripting methods:

- **Property canAddToMotionGraphicsTemplate()**
  method*app.project.item(index).layer(index).propertySpec.canAddToMotionGraphicsTemplate(comp)* Test whether or not the property can be added to the Essential Graphics panel for the specified composition. Returns true if the property can be added, false otherwise. If the property can not be added, it is either because it is not one of the supported property types or the property has already been added to that composition. After Effects presents a warning dialog.

Supported property types are:

- Checkbox
- Color
- Numerical Slider (i.e., a single-value numerical property, such as Transform > Opacity or the Slider Control expression control effect)
- Source Text

Parameters:

comp	The composition that you want to test adding the property to, compItem.

Returns:

Boolean.

- **Property addToMotionGraphicsTemplate()**
  method*app.project.item(index).layer(index).propertySpec.addToMotionGraphicsTemplate(comp)* Add the property to the Essential Graphics panel for the specified composition. Returns true if the property is successfully added, false otherwise. If the property is not added, it is either because it is not one of the supported property types or the property has already been added to that composition. After Effects will present a warning dialog. Use the *canAddToMotionGraphicsTemplate()* method to test whether the property can be added to a Motion Graphics template.

Parameters:

comp	The composition that you want to test adding the property to, compItem.

Returns:

Boolean.

- **CompItem motionGraphicsTemplateName attribute***app.project.item(index).motionGraphicsTemplateName* Read or write the name property in the Essential Graphics panel for the composition. The name in the Essential Graphics panel is used for the file name of an exported Motion Graphics template, for example My Template.mogrt. The following example sets the name for the active composition and then returns it as an alert:

```
app.project.activeItem.motionGraphicsTemplateName = "My Template";
alert(app.project.activeItem.motionGraphicsTemplateName);
```

Type:

String; read/write.

- **CompItem exportAsMotionGraphicsTemplate()**
  method*app.project.item(index).exportAsMotionGraphicsTemplate(doOverWriteFileIfExisting, file_path)* Export the composition as a Motion Graphics template. Returns true if the Motion Graphics template is successfully exported, false otherwise. The name in the Essential Graphics panel is used for the file name of the Motion Graphics template for example, My Template.mogrt. Use the motionGraphicsTemplateName attribute to set the name. Optionally specify the path to the folder where the Motion Graphics template file is saved. If not specified, the file will be saved in the current user's Essential Graphics folder:

macOS:

/Users//Library/Application Support/Adobe/Common/Essential Graphics/

Windows:

C:\\Users\\\\AppData\\Roaming\\Adobe\\Common\\Essential Graphics

If the project is changed since the last time it was saved, After Effects prompts the user to save the project. To avoid this, use the project *save()* method before exporting the Motion Graphics template.

Parameters:

doOverWriteFileIfExisting	Whether to overwrite an exsiting file of the same name, boolean. Required.
file_path	Path to the folder where the file will be saved. Optional.

Returns:

Boolean.

- **CompItem openInEssentialGraphics() method***app.project.item(index).openInEssentialGraphics()* Open the composition in the Essential Graphics panel.

Parameters:

None

Returns:

None

Where to find additional useful scripts

Find scripts, projects, and other useful items on the Adobe Add-ons website.

Dan Ebberts provides scripting tutorials and useful scripts in the scripting section of his MotionScript website.

Lloyd Alvarez provides a collection of useful scripts on his After Effects Scripts website.

The AE Enhancers forum provides example scripts and useful information about scripting (as well as expressions and animation presets) in After Effects.

Jeff Almasol provides a collection of useful scripts on his redefinery website.

Dale Bradshaw provides scripts and tricks on his Creative Workflow Hacks website.

The nabscripts website provides many useful scripts.

Christopher Green provides many useful scripts on his website.

Chapter 16: Collaboration with Adobe After Effects

Collaborate with Team Projects

Learn how to collaborate with others by receiving an invite from other collaborators or by inviting other collaborators. Learn how to remove a collaborator from a team project.

Share and manage changes with Team Project collaborators

Learn how to share changes, receive changes, resolve editing conflicts when working on team projects.

Chapter 17: Motion Graphics templates

Work with Motion Graphics templates in After Effects

The **Essential Graphics** panel allows you to build custom controls for motion graphics and share them as **Motion Graphics** templates via Creative Cloud Libraries or as local files. Essential Graphics panel works as a bucket in which you can add different controls, modify them, and then pack them as shareable **Motion Graphics** templates. A new workspace for working with the **Essential Graphics** panel in After Effects, named **Essential Graphics**, is available from the workspace bar. You can access the workspace from the **Window > Workspace**.

The Essential Graphics panel in After Effects can be used in four main ways:

- As a control surface within After Effects: Use the Essential Graphics panel as a control surface for your compositions. Drag parameters from your timeline into Essential Graphics panel to create shortcuts for the elements in your composition you change often.
- To create Master Properties that work as master controls that allow you to modify effect and layer properties of a composition when it is nested in another composition.
- To export Motion Graphics templates (.mogrt): Encapsulate your After Effects project into a Motion Graphics template that can be edited directly in Premiere Pro. All the source images, videos, and pre-comps necessary to maintain your design are packaged in the template. Only the controls you expose are available for customization in Premiere Pro that allows you to retain creative control of your design.
- To group controls together, control font properties, and add controls for CSV and TSV spreadshseet data sources to a Motion Graphics template. You can access the groups with the Add Formatting menu in the Essential Graphics panel. The Add Comment command can be accessed from this menu. **ADD LINKS TO RELEVANT ARTICLES**

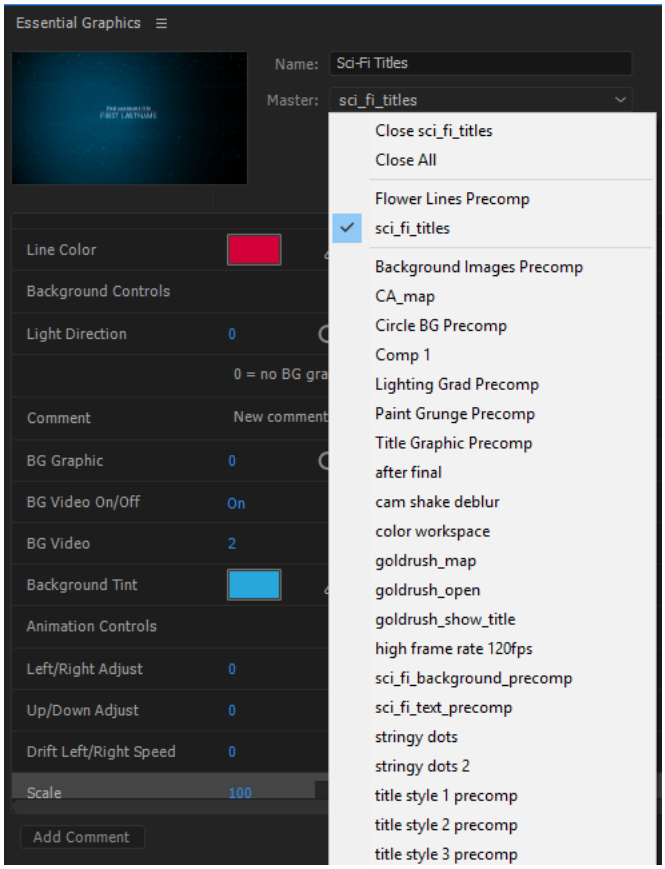
Creating Motion Graphics templates in After Effects

Creating Motion Graphics templates in After Effects

Work with Essential Graphics panel

Compositions in Essential Graphics panel

In the **Essential Graphics** panel, use the Master drop-down to select a composition in your project to start building a Motion Graphics template.



Viewing compositions from Master menu

To open a composition in **Essential Graphics** panel in After Effects, do any of the following:

- To open current composition, select **Composition > Open in Essential Graphics.**
- To open a particular composition, right-click a composition in the **Project** panel, and select **Open in Essential Graphics**.
- To open any composition in your project, click the **Master** menu in the **Essential Graphics** panel.

Master composition

The Master composition is the current composition in the **Essential Graphics** panel. You can add supported properties from the Master composition to the panel. You can also add properties from the compositions that are in the hierarchy of the master composition.

Properties from composition that are not in the hierarchy of the master composition are considered unrelated properties. When you add unrelated properties to the **Essential Graphics** panel, a warning message is displayed. The properties are still added to the panel, but are highlighted in red and have no effect when exported as a Motion Graphics template.

Tip: To use unrelated properties, nest the composition containing the properties into the master composition or the hierarchy.

Note:

*Unrelated properties do not work when the composition is exported as a **Motion Graphics** template.*

Add and modify controls

Add controls

You can add supported properties from any effect or any layer property group such as - **Transform**, **Masks**, and **Material Options**.

Types of supported controls:

- Check box
- Color
- Numerical slider (a single-value numerical property), such as Transform > Opacity or the Slider Control expression control effect
- Source text
- 2D point properties, such as Transform > Anchor Point, Transform > Position, and the Point Control expression control effect
- 2D scale properties, such as Transform > Scale
- Angle properties, such as Transform > Rotate and the Angle Control expression control effect

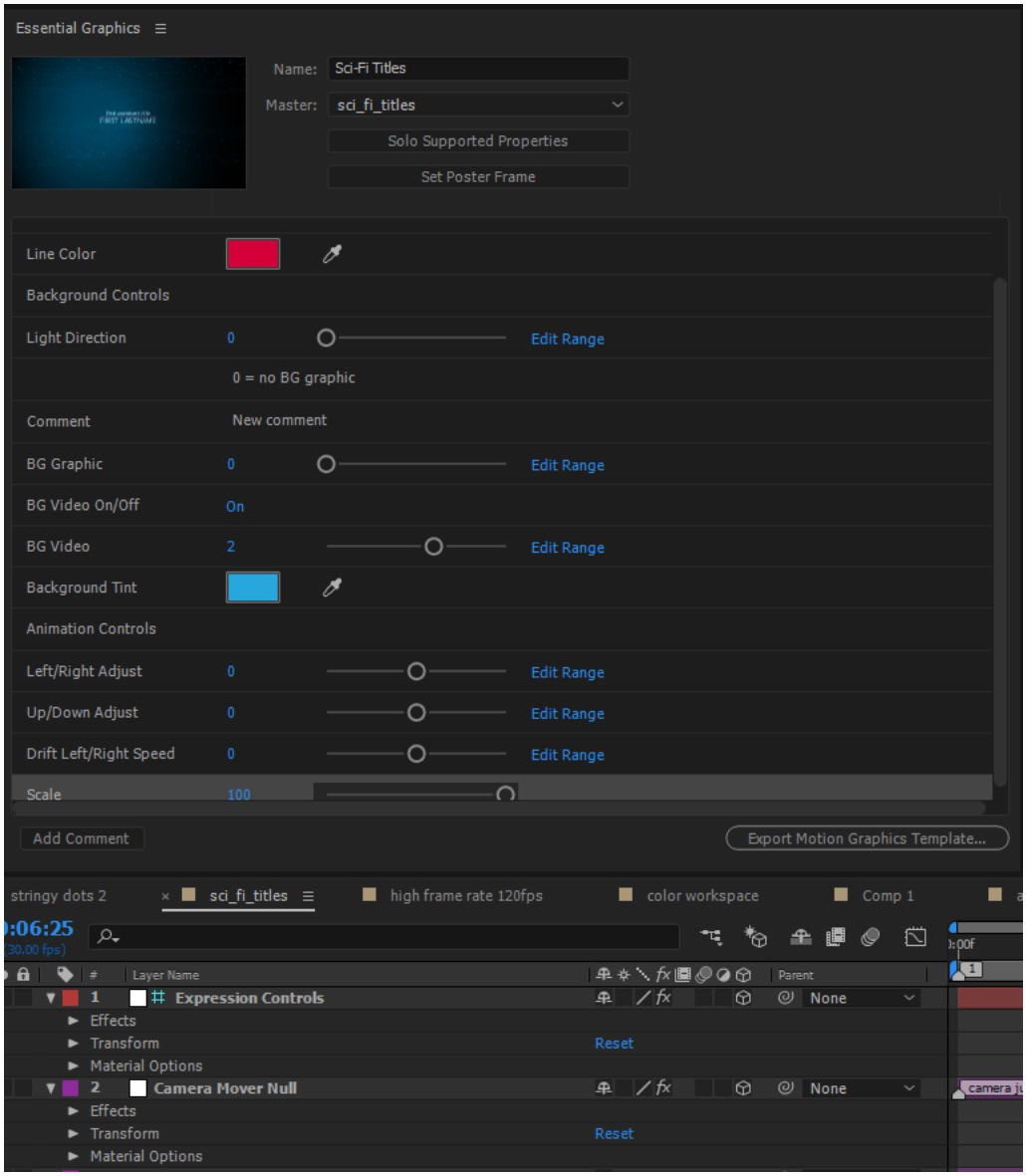
If you add unsupported properties, After Effects displays a warning message, 'After Effects Error: Property type is not yet supported for use in Motion Graphics templates.'

To add a control, drag single or multiple selected properties from the timeline into the **Essential Graphics** panel.

You can also use the **Add Property to Essential Graphics panel** command to add properties to the **Essential Graphics** panel from either the **Timeline** or **Effect Controls** panels. Use any of the following steps to add properties:

- Select a property in the **Timeline** panel, then select **Animation > Add Property to Essential Graphics**.
- Right-click a property in the **Timeline** panel or **Effect Controls** panel, then select **Add Property to Essential Graphics** from the menu.

You can also assign a keyboard shortcut to the **Add Property to Essential Graphics panel** command. To learn the steps, see Visual Keyboard Shortcut Editor.



Adding controls in the Essential Graphics panel

View supported properties

If you want to only view the properties supported by the **Essential Graphics** panel, click the **Solo Supported Properties** button in the panel. The button filters the properties and displays the supported properties in the timeline.

Modify controls

You can use the **Essential Graphics** panel to customize controls in the following ways:

- **Rename a control:** To rename a control, do any of the following:
  - Click the name field of the control and enter a new name.
  - Drag and highlight the current name and enter a new name.

- **Reveal source properties:** To reveal the source properties of a control in the timeline, right-click the control name and choose **Reveal in Timeline** from the context menu. The reveal option opens the related composition even if it is closed.
- **Reorder the controls:** To reorder the controls, drag them up or down in the panel.

The controls that you add to the **Essential Graphics** panel are linked to the source properties. Changing the value of a control also changes the value of the properties in the composition. For example, if you change the **Opacity** to 50% in the panel, the value of **Opacity** in the composition also changes to 50%.

The composition values are simultaneously updated as you slide the value of numerical controls in the panel. To disable the live update feature, hold *Option* (Mac) or *Alt* (Win) as you slide.

Create groups of controls

You can group controls in the Essential Graphics panel for better navigation and to reduce clutter. This is particularly helpful when you add long lists of editable controls or the master properties of nested compositions to the panel.

To create a group, click the **Add Formatting** menu in the lower-left corner of the **Essential Graphics** panel, then select **Add Group**.

To add a control to a group, drag it over the group name.

Font controls

When you add a text layer to the Essential Graphics panel, you can modify and control the font family, font style, size, and faux styles of that layer in a Motion Graphics template. Use the following steps to add font property controls to the panel:

1 Add the **Source Text** property of a text layer to the **Essential Graphics** panel.

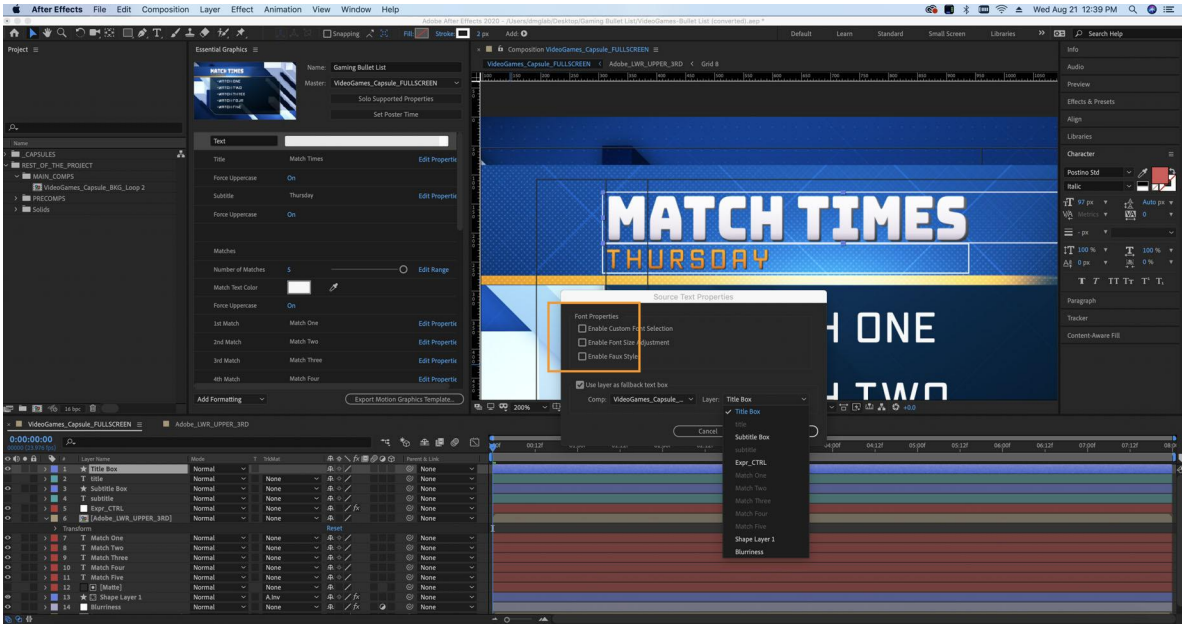
2 Click **Edit Properties** option on the right side of the control row.

3 In the Source Text Properties dialog, select the font properties to control from the following options:

- **Enable Custom Font Selection** - Adds the Font Family and Font Style controls.
- **Enable Font Size Adjustment** - Adds the Font Size control.
- **Enable Faux Styles** - Adds Faux Bold, Faux Italic, All Caps, and Small Caps controls.

Click OK.

There is another option in this dialog - **Use layer as fallback text box**, when you check it on, you can select a comp/subcomp and a shape or clip layer to determine an alternate text box for editing the text in Premiere Pro Program Monitor. This is needed because so many mogrts have text rects which are are unusable - either offscreen, incorrect size, or incorrect placement.



Alternate text rects

Note:

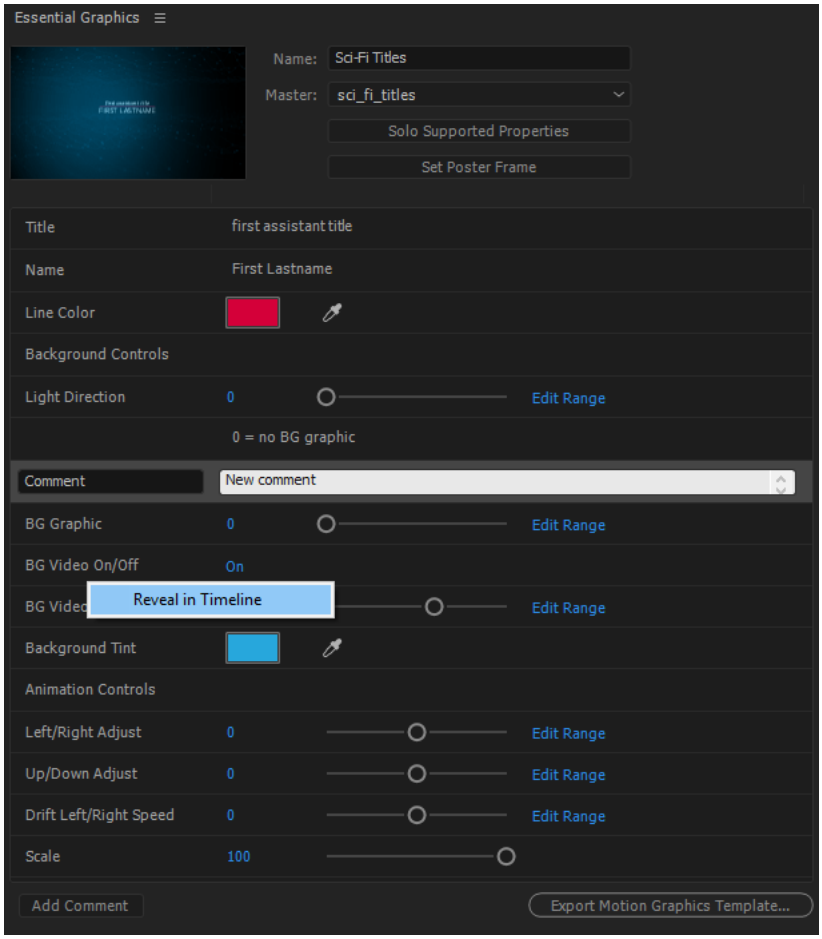
Font controls are unsupported as master properties of a nested composition.

Add comments in Essential Graphics panel

To add comments, click the **Add Comment** button at the bottom of the **Essential Graphics** panel. You can add multiple comments, rename them, and reorder them. You can also undo and redo adding comments, reorder them, and remove them if necessary.

- To rename, click the name field of the comment and enter a new name.
- To reorder, drag the comment up or down the panel.

To delete a comment, select the comment and press Backspace or Delete.



Modifying controls

Note:

*When you duplicate a composition in the **Project** panel (cmd+D Mac or ctrl+D Win), After Effects duplicates properties and comments added to the Essential Graphics panel for that composition.*

Export as Motion Graphics templates

Name the template

To name or rename your **Motion Graphics** template, click the name field of the template, and enter a new name.

Set poster frame for the template

You can set the poster frame for your template. The poster frame is used as the thumbnail image for your template in Creative Cloud libraries and the **Essential Graphics** panel in Premiere Pro.

To set the poster frame, follow these steps:

1 In the master composition, place the current-time indicator on the frame you want to select.

2 Click the **Set Poster Time** button in the Essential Graphics panel.

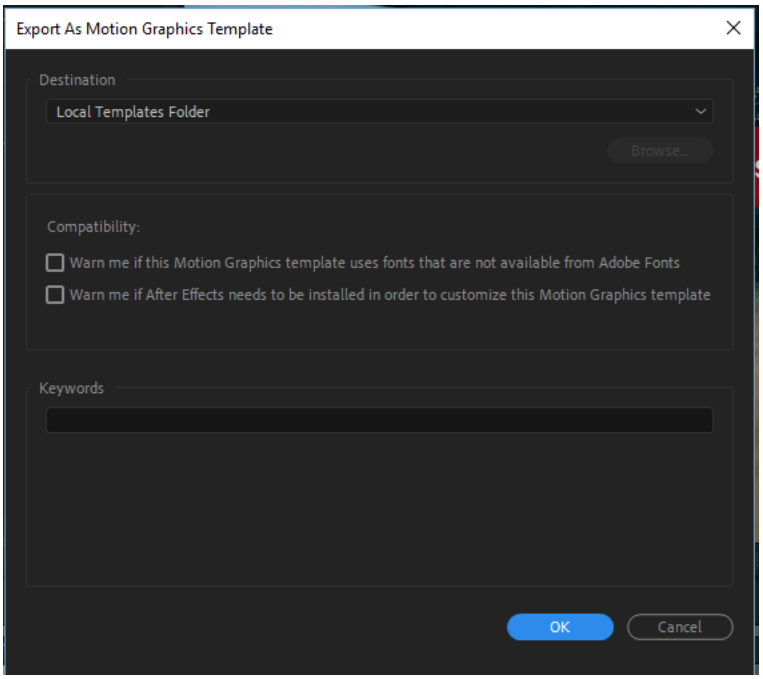
Export a template

To export your composition as a **Motion Graphics template**, follow these steps:

1 Click the **Export Motion Graphics Template** button at the bottom of the **Essential Graphics** panel. Compositions in the hierarchy of the master composition are included in the template.

2 In the **Export As Motion Graphics Template** dialog, click the **Destination** menu. The available destinations are:

- Creative Cloud Libraries: Add templates to your Creative Cloud Libraries.
- Essential Graphics: Add templates to the local folder by default. Templates stored in the **Essential Graphics** folder are directly available in the **Essential Graphics** panel in Premiere Pro.
- Local Drive: Save templates to a local directory. The templates you save to your local directory are not automatically available in the **Essential Graphics** panel in Premiere Pro.


Export As Motion Graphics Template
Destination
Local Templates Folder
Browse...
Compatibility:
Warn me if this Motion Graphics template uses fonts that are not available from Adobe Fonts
Warn me if After Effects needs to be installed in order to customize this Motion Graphics template
Keywords
OK
Cancel

Exporting the Motion Graphics templates

Select a check box under Compatibility:

- **Warn me if this Motion Graphics template uses fonts that are not available from Adobe Fonts:** Enable this option if you want After Effects to warn you if any fonts used by the composition are not available on Adobe Fonts.
- **Warn me if After Effects needs to be installed in order to customize this Motion Graphics template:** Enable this option if you only want to export After Effects independent features - for example, any third-party plug-ins.

For more information on adding assets to Creative Cloud Libraries, see Creative Cloud Libraries in After Effects.

Note:

These options only display warnings, they do not modify the content of the Motion Graphics template. To edit the project to meet the requirements, cancel the export and make the changes, then export the Motion Graphics template again.

3 Choose the export destination from the **Destination** menu and click **OK**.

Note:

You can author Motion Graphics templates (.mogrt files) that do not require the user to have After Effects installed on their computer to customize them. Make sure that your templates meet the following requirements to ensure an After Effects install is not required for the user of your .mogrt:

- Only the Classic 3D composition renderer is supported; the CINEMA 4D and Ray-traced 3D renderers are not supported.
- All effects included with After Effects are supported, except: Camera-Shake Deblur, Synthetic Aperture Color Finesse, Maxon CINEWARE, Puppet, and Warp Stabilizer.
- Dynamic Link footage is not supported such as Premiere Pro sequences or Character Animator CC scenes in an After Effects composition.
- FLV format footage and third-party plug-ins are not supported.

Open Motion Graphics templates as a project

To edit your After Effects Motion Graphics template (.mogrt files), you can open them in After Effects as a Project file. After you edit the template, re-export it as a .mogrt file.

To open a Motion Graphics template as a project, use the following steps:

1 Select **File** > **Open Project**.

In the **Open Project** dialog, select a .mogrt file, then click **Open**.

When you open a .mogrt as a project, After Effects extracts the project file and assets. In the **Extract "<filename>.mogrt"** dialog, choose a location to extract the .mogrt contents, then click **Extract**.

You can also modify a Motion Graphics template used in a sequence in Premiere Pro 12.1 with the following steps:

1 In After Effects, open the .mogrt file as a project. Modify one or more compositions, or add or change controls in the **Essential Graphics** panel.

2 After you make the edits, in the **Essential Graphics** panel, click **Export Motion Graphics Template** button. You can either replace the original .mogrt file or select a new location or name for the updated file.

3 In Premiere Pro, hold *Option* (MacOS) or *Alt* (Win) and drag the new or updated .mogrt from the **Browse** tab of the **Essential Graphics** panel and over the existing .mogrt clip in the sequence. Premiere Pro updates the **Edit** tab of the **Essential Graphics** panel with the new controls.

1 In After Effects, open the .mogrt file as a project. Modify the compositions, or add or modify controls in the **Essential Graphics** panel.

2 After you edit, in the **Essential Graphics** panel, click **Export Motion Graphics Template** button. You can either replace the original .mogrt file or select a new location or name for the updated file.

3 In Premiere Pro, in the **Browse** tab of the **Essential Graphics** panel, hold *Opt* (MacOS) or **Alt** (Win) and drag the new or updated .mogrt over the existing .mogrt clip in the sequence. Premiere Pro updates the **Edit** tab of the **Essential Graphics** panel with the new controls.

Work with data-driven Motion Graphics templates

Data-driven Motion Graphics templates allow you to quickly and accurately customize bar charts, line graphs, and more, without manual entry or deep knowledge of motion graphics.

With this feature, you can add controls for CSV (comma-separated value) and TSV (tab-separated value) spreadsheet data to the Essential Graphics panel. When you export these Motion Graphics templates with data controls to Premiere Pro, you can modify or replace them in Premiere Pro.

Another use is that the data controls in the **Essential Graphics** panel can work as a data browser or editor for CSV or TSV data layers in your composition without exporting it as a template. When you add a composition with spreadsheet data to the panel, the panel displays all the related data which is editable. If you are working with a nested composition, the data controls are not accessible as master properties of that composition.

Use the following steps to add data controls to the Essential Graphics panel:

1. Import a CSV or TSV file into your project and add it to your composition.
2. In the **Timeline** panel, twirl open the layer properties for the data layer.
3. Select and drag the data property group of the layer to the **Essential Graphics** panel.

You can modify the following properties for spreadsheet data in the Essential Graphics panel:

- Spreadsheet Properties: Click Edit Properties to the right of the data group to modify the following:
  - Data property type: Choose the data type for the values in each column. Use this to change how the spreadsheet values are represented in Premiere Pro. An After Effects author sets the type for each column in After Effects. In Premiere Pro, the type translates as either a text string, a hot text slider for numbers, or a hexadecimal value for color (for example, #EE0473).
  - Minimum Rows: In Premiere Pro, you can modify the number of rows used in the Motion Graphics template. Set the minimum number of rows allowed.
- Rows: In Premiere Pro, you can modify the number of rows used in the Motion Graphics template. Set the maximum number of rows allowed.
- Data properties:
  - Column names: Modify the column names that display in the Motion Graphics template.
  - Data values: Modify the value of a spreadsheet cell. To choose the row you edit, change the Row menu at the top of the Data values group.

Note:

When you add the Data property group of a data layer to the panel, it removes the expressions that link the data properties of the layer to the source data file. It changes them to static values. If you modify the source data file outside of After Effects, the static data values automatically update.

For more information on how to use these templates in Premiere Pro, see Work with data-driven Motion Graphics templates.

Note:

If you are working with .tsv files, specifically with Excel in German (but this impacts any language that uses a comma instead of a decimal), Excel saves the .tsv files as .txt files. You need to manually change the file extension to .tsv before attaching it to a Motion Graphics template in Premiere Pro.

Alternatively, you can use other spreadsheet tools like Open Office or Google Sheets.

Basics of Master Properties

Master Properties work as master controls that allow you to access layer and effect properties of a composition when it is nested in another composition. This can be time-saving when you build complex animations across multiple nested compositions as you don't have to open separate precompositions to view their properties. Master Properties can override their original values and keyframes, which allows you to reuse the same composition as multiple instances with different values. The source composition remains the same, your edits only create instances that you can render after editing your comp.

For detailed information, see Work with Master Properties to create Motion Graphics templates.

- **Item Title**
- **Item Title**
- **Item Title**
- **Item Title**
- **Item Title**

Use expressions to create dropdown menus in the Essential Graphics panel

When you author a Motion Graphics template, it is common to keep the MOGRT flexible for editors using them in Premiere Pro by giving sliders and checkboxes to customize properties. However, for more complex workflows with multiple options, using sliders or checkboxes is not always intiuitive, and is time consuming. You can use the Dropdown Menu Control which is especially helpful for authors of Motion Graphics Templates and editors in Premiere Pro as the menu makes it easier to have more control options and a simpler experience to adjust parameters.

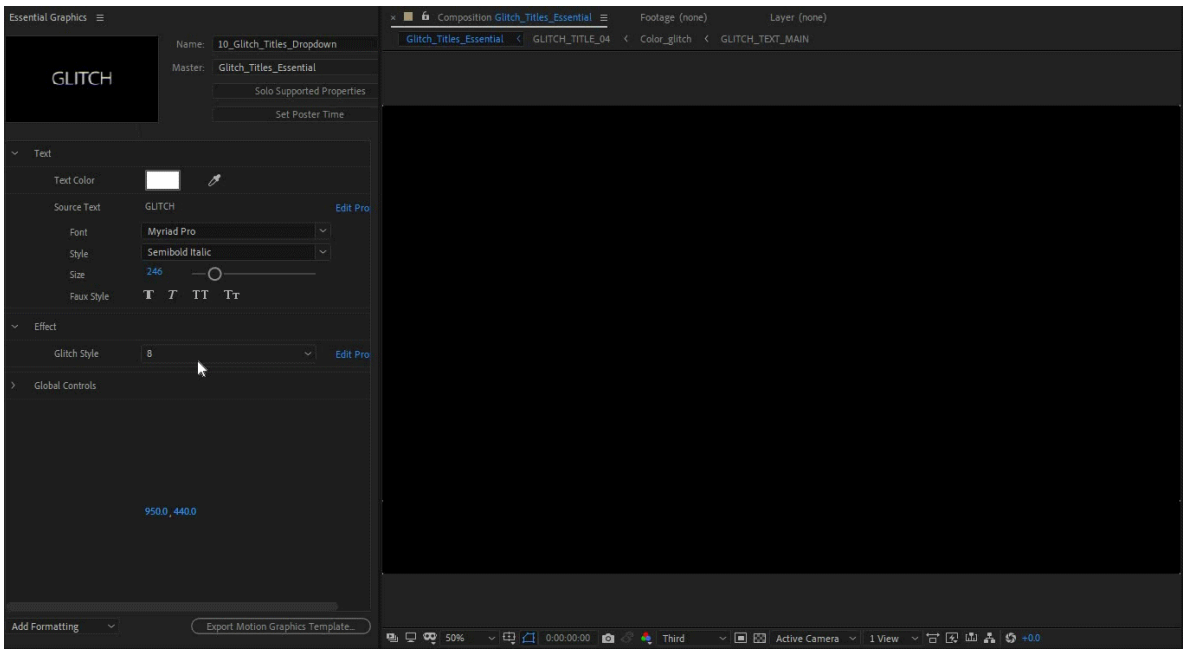
For detailed information, see Use expressions to create drop-down lists in Motion Graphics templates.

For more information on how it works in Premiere Pro, see Use Motion Graphics templates in Premiere Pro.

Use expressions to create drop-down lists in Motion Graphics templates

When you author a Work with Motion Graphics templates in After Effects(MOGRT), you can keep its properties flexible and enable editors to customize them in Premiere Pro. One way, you can do it is by creating sliders and check boxes. You can also create them using drop-down lists with different options.

Creating drop-down lists is beneficial because it provides more menu controls and a simpler editing experience for Premiere Pro editors. You can save these drop-down control settings as a template and use it later in different compositions and projects.



Different text options displayed when using the drop-down lists in After Effects

Why create drop-down lists

You can give sliders and checkboxes as editing options to editors in Premiere Pro but they can sometimes be less intuitive and more time consuming. In such cases, drop-down lists can be helpful. Use it to enable a Premiere Pro editor to choose from:

✔ **A selection of color themes** - For example, you can create a drop-down list for a group of colors you want to use for a movie title.

✔ **Different positions or designs** - For example, add a drop-down for the position of a lower third such as left or right.

✔ **Animation options** - For example, add a drop-down to select different animation durations.

✔ **Text or asset options** - For example, add a drop-down list for the different days of the week. This prevents the need for retyping source text, and also reduces the chance of errors in post production.

Set up a drop-down list control

Use the **Dropdown Menu Control** effect to create drop-down lists. To understand how this feature works, download the sample AE project file and get started.

1. **Create a composition.** Click the comp icon at the bottom of the projects panel, or select **New Comp** on the home screen.
2. To add a text layer, select **Layer > New > Text**, and type the text you wish to add. For this example, let's write Morning.
3. Open the Effects & Presets panel and search Fill Color, and drop it on the text layer.
4. Once you have all the layers in place, in the **Effects & Presets** panel, search **Dropdown Menu Control** and drop it onto the layers. You can also access it from **Effect > Expression Controls > Dropdown Menu Control**.

In the **Timeline** panel, twirl open the text layer properties and Alt-click the stopwatch icon next to **Source Text**.

In the expression text field, copy the following expression snippet that changes the source text:

var x = effect("Weekday")("Menu").value;

if (x === 1) { "Morning"; } else if (x === 2) { "Evening";

} else if (x === 3) {

"Night";

}

Use the pick whip tool and link the dropdown menu -named as Weekday to the Source Text property.

In the **Effect Controls** panel, click **Edit**. The dropdown menu control comes with a default menu with three items: Item 1, Item 2, Item 3. Use this to name your menu options. You can also add more options to the menu with the + - icon.

5 Add another dropdown menu and rename it Color. Next, twirl open the the Fill color layer, and alt-click the Color property. To change the text color, in the expression field, copy the following text:

dropDownIndex = effect("Color options")("Menu").value;

switch (dropDownIndex) { case 1: hexToRgb("FF3211"); break; case 2: hexToRgb("CC1234"); break; default: hexToRgb("BBB001") };

Use the pick whip tool and link the dropdown menu to the Color property. Name this dropdown as Color options. You can change the color accordingly from the color chart next to the color property.

6 To hook up the two dropdown menu properties to each other, use the Color options pick whip tool and link it to the Weekday dropdown menu. The Color options dropdown menu references the Weekday dropdown menu, which means that the Weekday you select also changes the text color.

7 Go ahead and drag these dropdown menu into the **Essential Graphics** panel, and use them to create Motion Graphics templates.

Sample expressions for drop-down list controls

Just as with other expression controls such as sliders, the values of the menu are referred to as indexes in expressions. You can copy from the sample expression below into the expression text field to achieve different results with the dropdown menu.

Note:

The names of the menu items itself are not read by the expression. Instead, it is reading the index, meaning the hierarchal position of the menu item in the list.

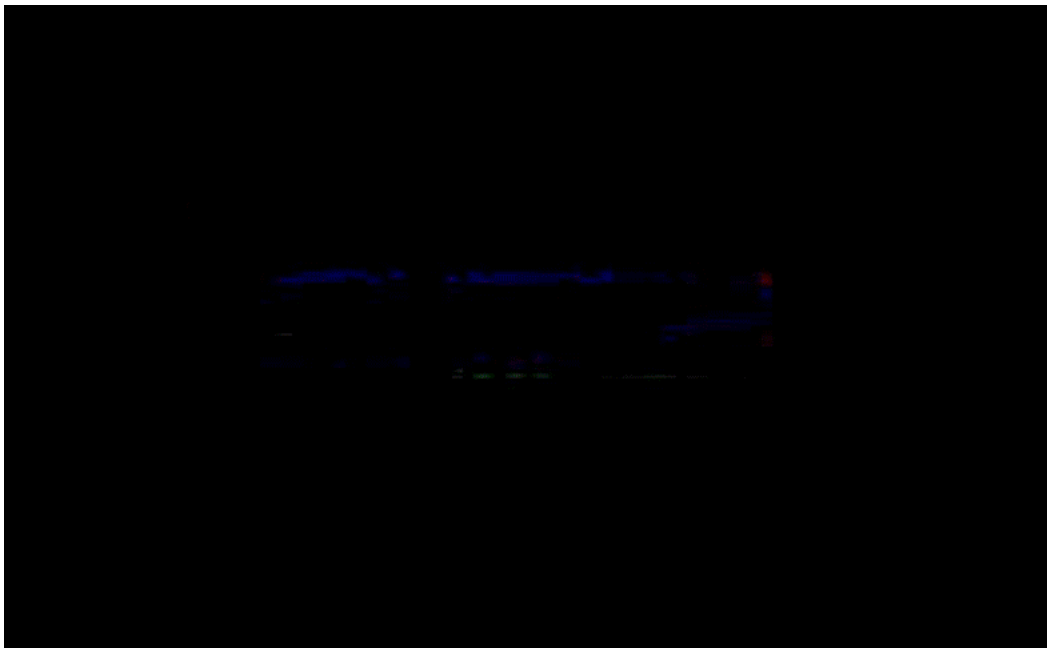
Sample 1: Define the color of a layer and reference it to the menu items in the dropdown control

dropDownIndex = thisComp.layer("Null 2").effect("Dropdown Menu Control")("Menu").value;

switch (dropDownIndex) { case 1: hexToRgb("FF4678"); break; case 2: hexToRgb("CC1234"); break; default: hexToRgb("BBB007") };

dropDownIndex = thisComp.layer("Null 2").effect("Dropdown Menu Control")("Menu").value;

switch (dropDownIndex) { case 1: hexToRgb("FF3211"); break; case 2: hexToRgb("CC1234"); break; default: hexToRgb("BBB001") };



Changing colors using the expression snippet

Sample 2: Use source text with a dropdown menu control

If you have a dropdown menu with the following menu items in this order:

1. Monday
2. Tuesday
3. Wednesday

Monday is index 1, Tuesday is index 2, as long it is the second item in the list. If you rename Tuesday to anything else, the expression does not break since it is still at index 2.

Here a simple example for using source text with a Dropdown Menu Control:

x = comp("CompName").layer("LayerName").effect("Dropdown Menu Control")("Menu");

if (x == 1) {

text.sourceText = ("Monday");

}

if (x == 2) {

text.sourceText = ("Tuesday");

}

if (x == 3) {

text.sourceText = ("Wednesday");

}

Sample 3: Define the source text of a text layer and reference it to the menu items in the dropdown control

var listItems = [

"Lambs", "Pups", "Not a thing",]; var dropDownValue = effect("Dropdown Menu Control")("Menu").value; listItems[dropDownValue - 1];

var x = effect("Dropdown Menu Control")("Menu").value;if (x === 1) { "Lambs"; } else if (x === 2) { "Pups"; } else { "Not a thing"; }

x = effect("Dropdown Menu Control")("Menu").value; switch (x) { case 1 : "dog"; break; case 2 : "cat"; break; default : "default" }

Things to keep in mind when using drop-down list controls

- Always rename the drop-down list control to something that reflects the contents best.
- The menu options in the **Dropdown Menu Control** effect are not case or text sensitive. This means, even if you rename the menu items, the expression does not break. However, they are position sensitive, so changing the position of the menu option breaks the expression.
- Maintain a balance between the different components used in your motion graphics templates. For instances where there are ranges, go for sliders, and in instances where there are options like yes or no, use checkboxes.

- The dropdown menu that you link all the other dropdown menus to becomes the parent. The dropdown menus in the comp reference the parent menu and behave accordingly.

Have a question or an idea?

If you have a question to ask or an idea to share, come and participate in our After Effects community. We would love to hear from you and see your Motion Graphics templates.

Work with Master Properties to create Motion Graphics templates

Master Properties work as master controls that allow you to access layer and effect properties of a composition when it is nested in another composition. This can be time-saving when you build complex animations across multiple nested compositions as you don't have to open separate precompositions to view their properties. Master Properties can override their original values and keyframes, which allows you to reuse the same composition as multiple instances with different values. The source composition remains the same, your edits only create instances that you can render after editing your comp. Refer to the Glossary of terms for a list of terms used to explain Master Properties.

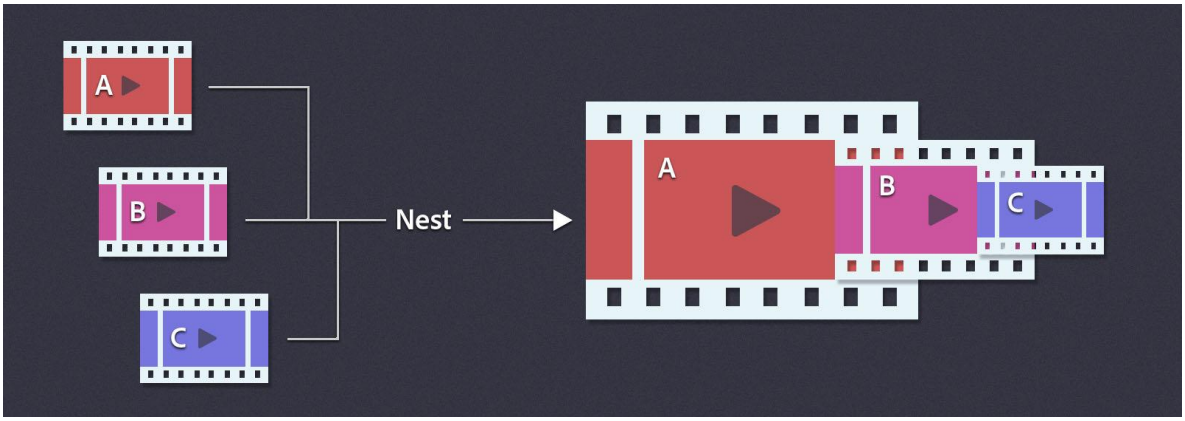
To create **Master Properties**, in the **Essential Graphics** panel, add properties from a nested composition, or nest the composition (**Layer > Precompose**) after you add the properties. For more information on the property types supported by the Essential Graphics panel, see Types of supported controls. Once you nest the composition, the **Timeline** panel displays the **Master Properties** group of the precomposition layer.

The core workflow to create **Master Properties** is similar to how you create controls for a **Motion Graphics** template. The difference is how you use the properties - whether you use the master properties on a precomposition in After Effects or on a **Motion Graphics** template in Premiere Pro.

Glossary of terms

Refer to the glossary of terms (existing and new) to understand the commonly used terms when you work with compositions and Master Properties:

- **Nest and Precomposition**

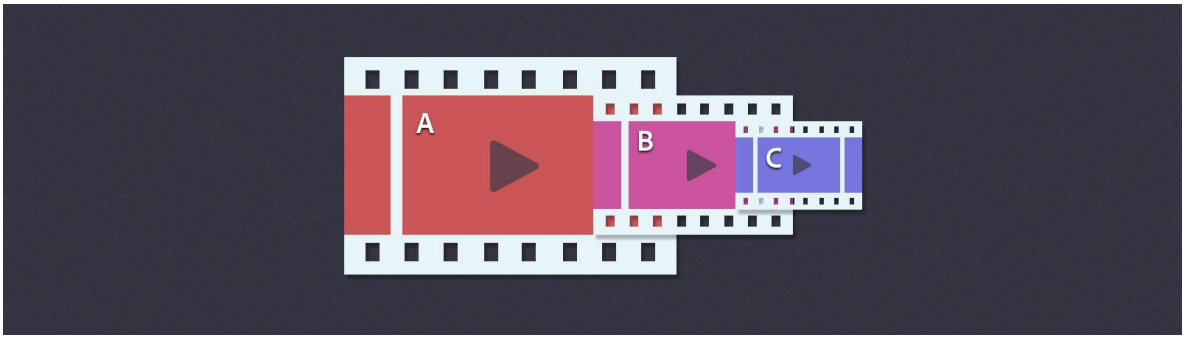


Nest and Precomposition

Nest: To place a composition inside other composition.

Precomposition: A composition that is nested inside another composition in a project.

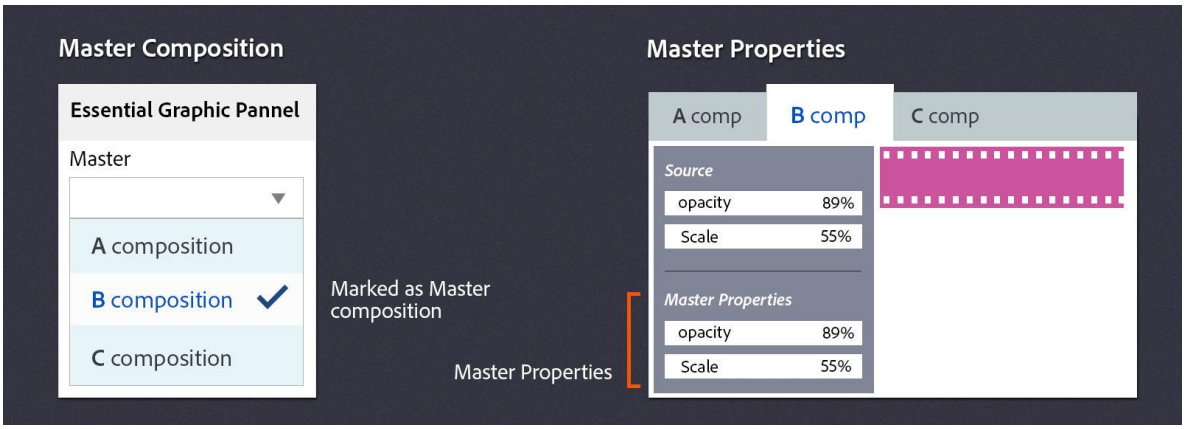
- **Parent composition and Child composition**



Parent composition and Child composition hierarchy

When a composition, for example - Comp A is placed inside another composition, for example - Comp B, Comp A becomes the **Parent composition** which contains Comp B - the **Child composition**.

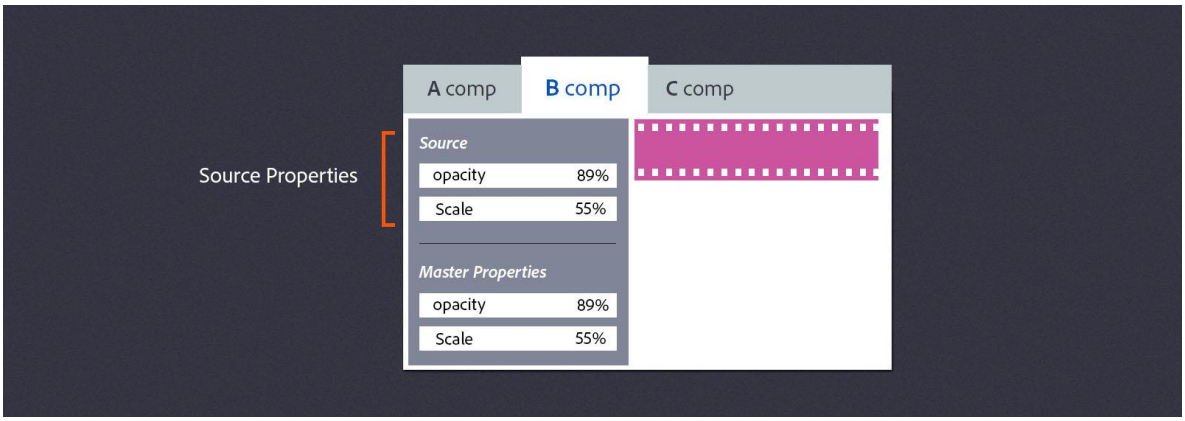
- **Master composition and Master property**



Master Properties and Master Composition

A composition you set as Master in the Essential Graphics panel is the **Master composition**. For a master composition, when you add a layer or effect property from the Timeline to the Essential Graphics panel, the property is called the **Master property**.

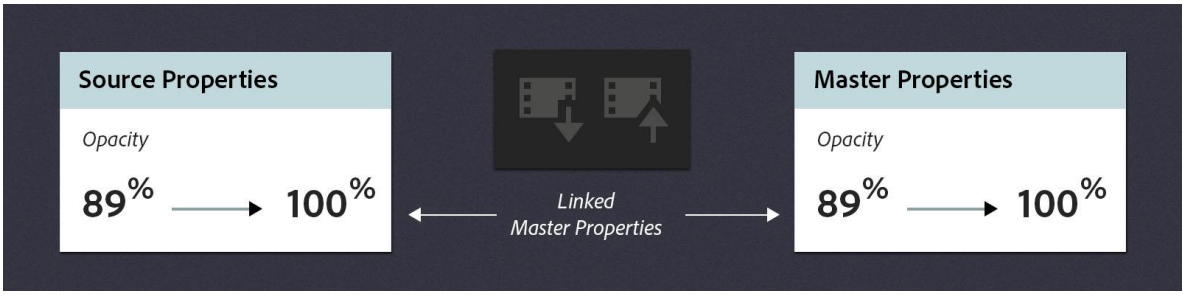
- **Source property**



Source property

The layer or effect property that a master property refers to.

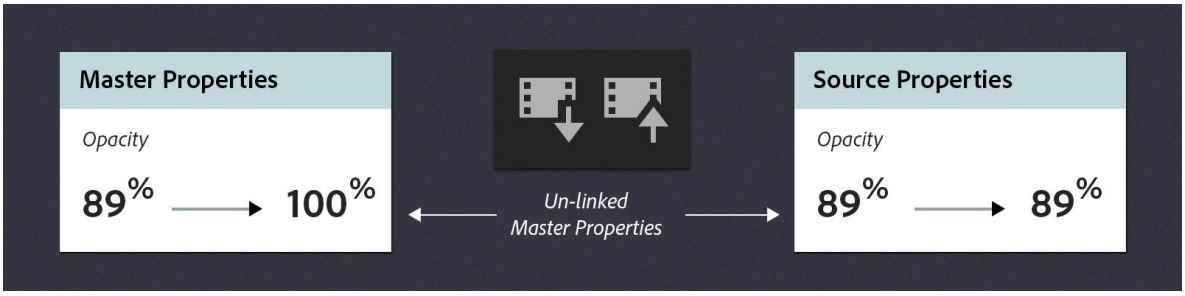
- **Linked property**



Linked property

A master property of a precomposition when the source property is not modified

- **Unlinked property**



Unlinked property

A master property of a precomposition when the source property is modified.

- **Override**

To change the value, keyframe, or expression of a master property on a precomposition.

Work with Master Properties

Linked properties - When you nest a master composition, the master properties of that precomposition link to the source properties. For example, if Comp B is nested in Comp A, the effect and layer properties of Comp B are the source properties. From Comp B, the properties that you add to the Essential Graphics panel are the Master Properties. When you modify the source properties, master properties of the precomposition also change.

Unlinked properties - When you modify master properties of the precomposition, however, they become unlinked. Unlinking creates an instance of the master composition. You can modify both the master properties and the source properties independently.

When you modify a master property, it overrides the value or keyframes of the source property. The precomposition is a unique instance of the master composition and only this instance renders with the modified value or keyframes.

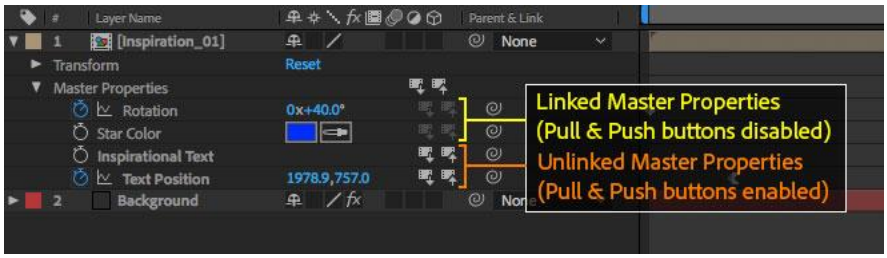
Pull and Push buttons

When you modify a master property, the Pull and Push buttons in the **Timeline** panel are enabled, and the name of the master property turns bold. These are the indications that a property is unlinked.

The Pull and Push buttons relink a master property with the source property. There are Pull and Push buttons for each master property, and for the entire **Master Properties** group.

- **Pull** discards the modified value, keyframes, and expression of a master property.
- **Push** applies the modified value, keyframes, and expression of a master property to the source property.

After you click either the Pull or Push button, master properties again link to their source properties, and disable the Pull and Push buttons.



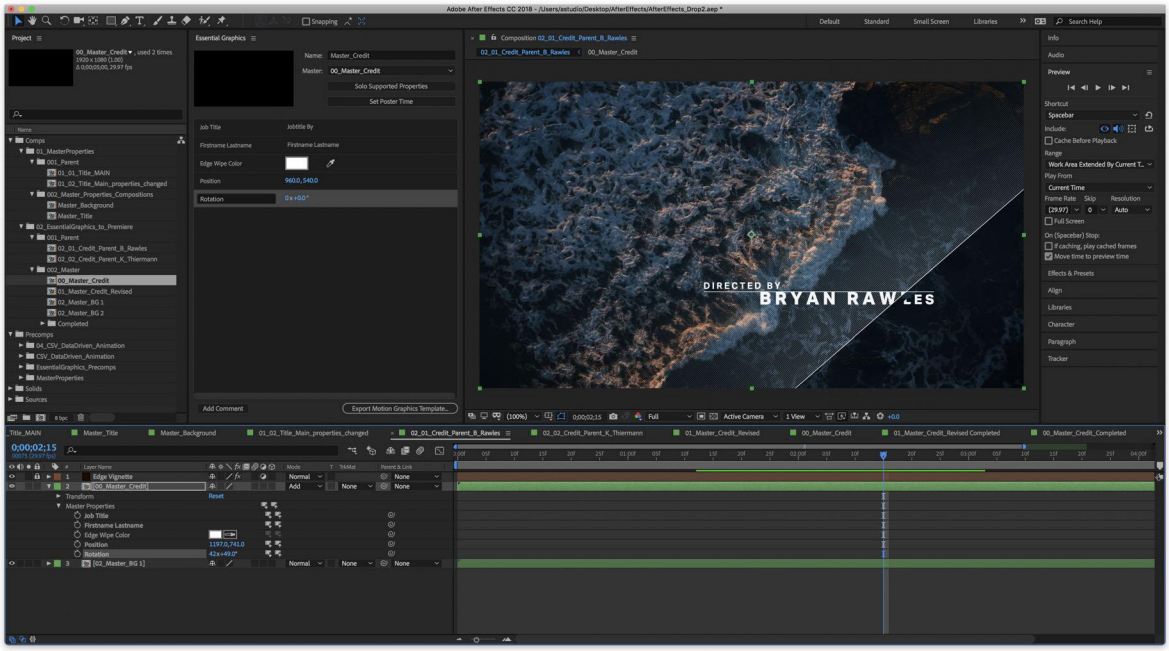
Pull and Push buttons

When you push a modified master property back to source property, all instances of the same master composition are updated if the same master property is linked. For example, you create a master composition for a credit roll and nest it multiple times, and modify the color master property on only one of the precompositions. When you push the new color value back to source value, all instances of the master composition render with the new color value.

Relink Master Properties

- To relink multiple master properties of a precomposition with their source properties:

Select the specific master properties and click the **Pull** or **Push** button on the **Master Properties** group.



Relink multiple master properties

- To relink all master properties of a precomposition with their source properties:

Deselect all master properties in the Timeline panel and click the Pull or Push button on the Master Properties group.

Modify Source Text master properties

In the context of a parent composition, you cannot use the Type tools to modify Source Text master properties in the Composition panel.

To modify the text string of a Source Text master property, do either of the following:

- Right-click the Source Text master property and select **Edit Value**. Edit the text string in the dialog, then click **OK**.
- Apply an expression to the Source Text master property. Ensure to include double quotes around the new string. For example, "She sells seashells by the sea shore."